Temiskaming and Northern Ontario Railway Commission

THE MINING INDUSTRY

IN THAT PART OF

NORTHERN ONTARIO

SERVED BY THE

Temiskaming and Northern Ontario Railway

ONTARIO GOVERNMENT RAILWAY

HON. W. H. HEARST, PREMIER

COMMISSION:

J. L. ENGLEHART, Chairman

DENIS MURPHY GEO. W. LEE

W. H. MAUND, Sec.-Treas.

(Appendix to Annual Report Temiskaming and Northern Ontario Railway Commission)

CALENDAR YEAR 1915

By ARTHUR A. COLE

Mining Engineer

PRINTED BY ORDER OF

THE LEGISLATIVE ASSEMBLY OF ONTARIO

TORONTO:

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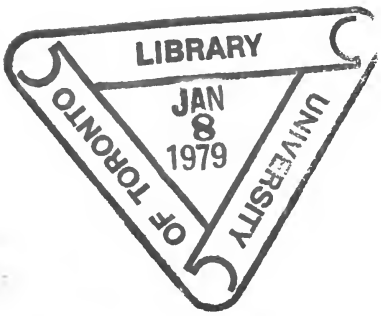

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WILLIAM BRIGGS
Corner Queen and John Streets
TORONTO

To His Honour John Strathearn Hendrie, C.V.O., a Lieutenant-Colonel in the Militia of Canada.

Lieutenant-Governor of the Province of Ontario.

May it Please Your Honour:

The undersigned has the honour to present to Your Honour Report of the Mining Engineer of the Mining Industry in that part of Northern Ontario served by the Temiskaming and Northern Ontario Railway for the calendar year 1915.

Respectfully submitted,

F. G. Macdiarmid,

Minister of Public Works.

Hon. Finlay G. Macdiarmid,

Minister of Public Works,

Toronto.

Sir,—I have the honour, by direction, to submit to you, Report of the Mining Engineer on the Mining Industry, in that part of Northern Ontario served by the Temiskaming and Northern Ontario Railway, for the calendar year 1915.

I have the honour to be,

Sir,

Your obedient servant,

W. H. Maund,

Secretary-Treasurer.

TEMISKAMING AND NORTHERN ONTARIO RAILWAY COMMISSION

J. L. ENGLEHART, Chairman..

DENIS MURPHY, Commissioner.

GEO. W. LEE, Commissioner.

W. H. MAUND, Secretary-Treasurer.

A. A. COLE, Mining Engineer.

The Dome Mines, Ltd. General view, showing mill, power house, and No. 2 development shaft.

GENERAL

The business depression which resulted from war conditions was felt in the mining industry of the Temiskaming district, but to a much smaller extent than in many other lines of business activity. The falling off in the production of silver was more than made up by the increase in the production of gold, so that the combined production of the precious metals shows an increase of over one million dollars over 1914.

Ontario has now become the largest gold and silver-producing Province in Canada, and it is largely the Cobalt and Porcupine Camps that have placed her in this position. Ontario produces 44 per cent. of Canada's gold and 87 per cent. of her silver.

The huge sums of money spent on this continent for war munitions resulted in the accumulation of large dividends and stock profits, and of this surplus money much was available for mining enterprises. At the same time, claim-holders were more ready than formerly to listen to reasonable propositions and, as a consequence, there was much activity in the mining districts, and many prospects changed hands to interests that are more likely to proceed with active development.

The importance of the mining industry to the T. & N. O. Railway is shown in a comparative table compiled according to the amount of business attributable to each industry. The percentages are practically the same, whether tonnage or value is considered, as the commodities are mixed in all cases:—

DISTRIBUTION OF GROSS FREIGHT REVENUE FOR THE TEMISKAMING AND NORTHERN ONTARIO RAILWAY,

Year, 1915.

—	Percentage.	Whole Tons.	Revenue.
			$ c.
Mining	46	321,140	445,843 34
Agriculture	22	153,589	212,684 16
Lumbering	12	83,776	118,608 36
Miscellaneous and through	20	139,626	200,206 83
Total	100	698,131	$977,342 69

INCREASED COST OF SUPPLIES.

Increased cost of supplies has raised production costs of all metals, but this has been more or less compensated by an all-round rise in price, except in the case of gold and silver. It is these precious metals also that are chiefly affected by the rise in milling costs. The following statement gives comparative prices on some of the more important commodities used in mining and milling in Cobalt:—

COMPARATIVE STATEMENT OF PRICES

(ANTE-BELLUM AND CURRENT),

ON SOME COMMODITIES USED IN MINING AND MILLING AT COBALT.

Article.	Ante-Bellum.	March, 1916.
	$ c. $ c.	$ c. $ c.
Mine Supplies—		
Explosives—F.O.B. Cobalt car load lots 40%	12 98	19 58
" " " 50%	14 48	22 33
" " " 60%	15 98	25 08
Detonators—per 1,000, No. 6	10 00	22 80
" " No. 8	14 00	39 75
Safety Fuse—per case, 6,000 feet	26 35	30 10
Steel—F.O.B. Montreal—per pound—drill	06– 06½	08– 08½
" " " hollow	12	16– 18
" " " tool	70– 80	3 00– 4 00
" " " plate	1 80	2 60
Fuel Oil—per gallon—tank cars	06½	13
Gasoline "	20	37
Milling Supplies—		
Aluminum Dust—per pound	34– 38	75– 90
Caustic Soda—per 100 pounds	1 30	7 50
Chrome Steel Balls—per 100 pounds	4 16	7 58
Cyanide—contract, per pound	15	16
" no contract, per pound	15	20– 25
Mercury—per flask, 75 pounds	37 00	200 00–300 00
Pebbles—per ton, F.O.B. New York—French	9 75	13 25
" " " Danish	13 00	15 00– 16 00
Soda Ash—per 100 pounds	1 27	3 91
Sulphuric Acid "	1 30	1 95
Zinc Dust—per pound	06½	33– 35

Mining machinery has advanced 20% to 30%.
Electrical equipment, 50% to 60%.

Cost of production is not a fixed figure but varies from time to time, even under normal conditions. By the introduction of better methods, treating larger tonnages, and general economies the careful manager is always trying to reduce his production costs. A comparison of production costs before the war and now will not, therefore, in all cases show the result of increased cost of material, as this increase may be offset by better practice. Thus, in the case of the Nipissing low-grade mill, notwithstanding an increase of 20c. per ton of ore treated in the cost of supplies, the total cost of treatment was reduced 7c. per ton during the year. At this mill also the present high war cost of aluminum dust will make it necessary to substitute some other method of precipitation when the present contract for dust expires. Experiments on a large scale are now being carried on with the use of sodium sulphide as a precipitant, the resulting silver sulphide being desulphurized by the use of aluminum ingots in a caustic soda solution, before being melted down to bullion. The results so far are satisfactory, and it is likely that this procedure will be adopted. Mining costs at Cobalt all show increases, and this may be illustrated by the selection of an individual case. At this mine the actual cost of underground drifts and crosscuts has increased 39c. per ton over the cost before the war. Of this amount, 32c. has been caused by the rise in price of explosives, and 7c. has been caused by the rise in the price of fuse, caps and steel. In shaft work, the increased cost is 32c. per ton. Stoping cost has increased from 10c. to 15c. per ton, depending on the width of stope, hardness of rock, and so forth.

At Porcupine the increased cost of supplies may be judged by the following table, compiled by the Canadian Mining & Finance Co., Ltd.:—

COMPARATIVE STATEMENT OF PRICES
(ANTE-BELLUM AND CURRENT),
ON COMMODITIES USED IN MINING AND MILLING AT PORCUPINE.

Article.	Ante-Bellum.	March, 1916.	Approximate Advance.
	$ c.	$ c.	Per cent.
Mine Supplies—			
Dynamite, 1¼ in., 40% ..... per cwt...	13 10	19 70	50
" " 50% ..... " ..	14 60	22 45	52.5
Detonators, No. 8..... .....per 1,000..	12 60	39 70	215
Safety Fuse..... .....per case..	23 95	28 20	18
Time Fuses..... per 1,000 .	5 40	10 25	90
Tamping Bags ..... " ..	1 60	2 00	25
Connecting Wire ..... per lb...	50	70	40
Rails..... per ton..	43 00	57 50	33
Track Spikes ..... per keg..	3 25	4 50	39
Track Bolts..... " ..	6 00	9 00	50
Shovels..... per doz...	7 60	9 00	18
Mill Supplies—			
Borax..... per lb...	11¾	17¼	47
Cyanide ..... " ..	15	24	60
Zinc Dust ..... " ..	06⅝	27	427
Muriatic Acid..... per cwt...	1 70	2 93	80
Soda Ash..... " ..	2 25	3 59	57
Lead Acetate ..... " ..	8 10	14 30	75
Crucibles..... number..	07½	13	74
Fuel Oil ..... per gal...	09	13¾	51
Pig Lead .....per cwt...	5 65	10 06	78
Litharge ..... " ..	5 65	12 60	127
Zinc Spelter ..... " ..	6 48	17 25	276
Pebbles—Danish ..... per ton..	22 03	26 80	22
Globe Liners..... per lb...	03¼	03½	8
Shoes and Dies.....per cwt...	4 85	6 65	37
Cams..... each..	20 26	23 20	14.5
Cam Shaft..... " ..	83 00	90 00	8.5
General Supplies—			
Lubricating Oils	.....	.....	10
Gasoline.....	.....	.....	65
Corrugated Iron.....	.....	.....	50
Iron and Soft Steel.....	.....	.....	50
Pipe	.....	.....	60
Nails.....	.....	.....	40

The advanced price of explosives has added 10c. per ton to mining costs, and the prospects are that prices will continue to rise till the end of the war. Milling costs at the Hollinger will be increased approximately 7c. per ton owing to the advanced price of zinc dust. At the beginning of hostilities this company contracted for a supply of zinc dust sufficient to last them eighteen months. This supply will soon be consumed and they have been forced to make new contracts at more than double the old contract price. Other chemicals and supplies have steadily advanced in price, and they estimate that their working costs will be at least 20c. per ton higher than they would be with normal prices prevailing.

At the Dome Mine mining and milling costs have advanced from 16 per cent. to 18 per cent. above normal on account of increased cost of supplies. At some of the mines for their underground work ammonia powder is now being used where the ventilation is good, and in this way the increased cost of explosives is offset to a certain extent. In some of the milling practice also it has been found that economies can be effected by the use of smaller quantities of zinc dust and cyanide.

GOLD

Ontario's gold production is steadily increasing, and, as formerly, most of the production came from Porcupine, but Kirkland Lake and Munro Districts also assisted.

Porcupine

At Porcupine the following mines produced gold during the year, and in almost all cases showed increases over 1914. They are as follows:—Hollinger, Dome, Acme, McIntyre, Porcupine Crown, Vipond, Dome Lake, Gold Reef, Schumacher, Porcupine Pet, Mines Leasing Co. (Rea), Porphyry Hill, and Excelsior.

The steady advance of the Porcupine camp is shown in the following production table:—

PORCUPINE GOLD PRODUCTION, 1910-1915.

Year.	Value.
	$
1910	35,539
1911	17,187
1912	1,730,628
1913	4,284,928
1914	5,203,229
1915	7,580,766
Total	18,852,277

Power.

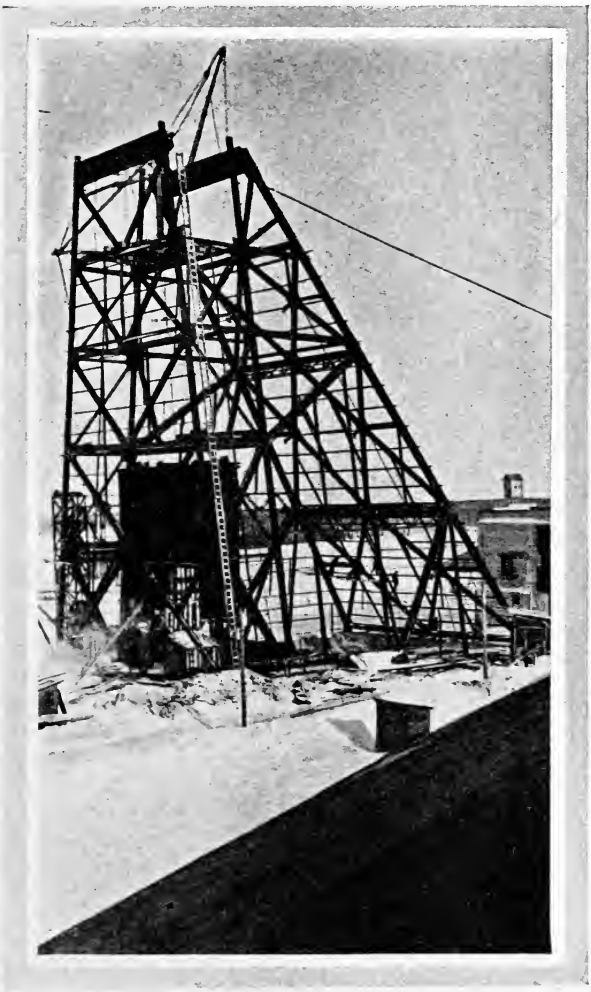
Production was curtailed in the early part of the year due to low water resulting in a shortage of power for operating the mines, and this condition was not relieved until the second week in April. Most of the mines have made provision for this contingency by installing auxiliary steam plants, and these now amount to about 2,500 h.p. In order to meet the rapidly increasing demand for power in the Porcupine camp the Northern Canada Power Company is installing at Sandy Falls a 2,500 h.p. Canadian General Electric generator, direct connected to an I. P. Morris water-wheel, with surge tank and wooden stave penstock and controlling valves. This company also proposes to install during 1916 a 4,000 h.p. unit at Wawaitin. These additions when completed will give the Wawaitin power plant a capacity of 11,000 h.p. and the plant at Sandy Falls a capacity of 5,000 h.p. Conservation dams to prevent a shortage of water are also being constructed.

HOLLINGER GOLD MINES, LIMITED.

The following notes have been compiled from the Fifth Annual Report of the Hollinger Gold Mines, Limited, covering operations for the year 1915.—

RECORD.

Year.	Tons of Ore Milled.	Value Recovered.	Dividends Paid.
		$ c.	$
1911	1,000	46,082 52	.....
1912	45,195	933,682 00	270,000
1913	138,291	2,466,220 24	1,170,000
1914	208,936	2,688,354 80	1,170,000
1915	334,749	3,249,698 33	1,560,000
Totals	728,171	9,384,037 89	4,170,000



The Canadian Mining & Finance Co., Ltd. Central shaft headframe. 21st February, 1916.

INCOME AND EXPENSES FOR THIRTEEN PERIODS OF THE YEAR 1915.

Period ending	Bullion produced.	Other Income.	Total Income.	Operating Expenses.	Gross Profits.	Added to Surplus.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Jan. 28.....	240,208 27	1,380 75	241,589 02	90,602 47	150,986 55	30,986 55
Feb. 25.....	242,775 51	1,260 84	244,036 35	89.321 46	154,714 89	34,714 89
Mar. 25	238,052 00	3,403 83	241.455 83	90,451 07	151,004 76	31,004 76
Apl. 22.....	223,037 29	3,678 90	226,716 19	85,259 07	141,457 12	21,457 12
May 20.....	212,323 61	11,526 42	223,850 03	84,662 69	139,187 34	19,187 34
June 17..... ...	214,582 15	6,693 70	221,275 85	95,355 01	125,920 84	5,920 84
July 15.....	211,130 68	6,702 53	217,833 21	93,611 00	124,222 21	4,222 21
Aug. 12.....	238,712 00	6,821 29	245,533 29	97,244 42	148,288 87	27,288 87
Sept. 9.....	238,304 87	6,189 39	244,494 26	94,559 22	149,935 04	29,935 04
Oct. 7.....	243,606 43	6,024 29	249,630 72	91.288 50	158,342 22	38,342 22
Nov. 4.....	274,759 48	8,785 27	283,544 75	98,775 94	184,768 81	64,768 81
Dec. 2.....	308,343 74	5,941 54	314,285 28	103,726 76	210,558 52	90,558 52
Dec. 31.....	283,977 81	11,475 74	295,453 55	100,415 38	195,038 17	76,038 17
				1,215,272 99	2,034,425 34	474,425 34
By stores and sundry adjustments.....				24,041 43	24,041 43	24,041 43
	3,169,813 84	79,884 49	3,249,698 33	1,191,231 56	2,058,466 77	498,466 77

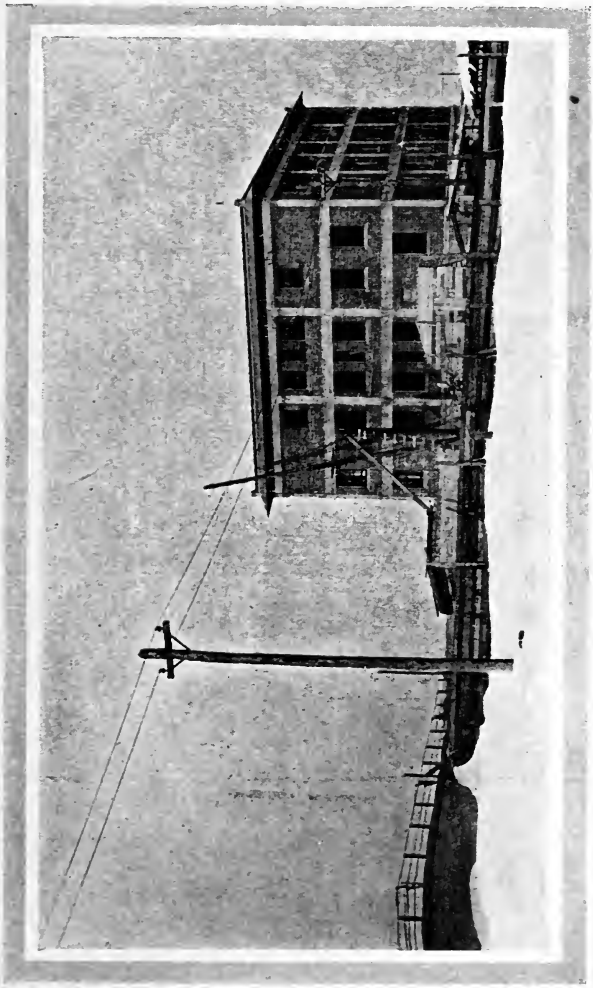
The Mine.

Operations have been carried on without interruption, except in March, when a shortage of power caused a temporary reduction in work. Total development underground for the year consisting of shafts, drifts, crosscuts, raises and winzes amounted to 10,805 feet, and 8,378 feet of diamond drilling. The ore broken during 1915 was 321,052 tons.

The ore was hoisted from the different levels as follows:—

Level. Above.	Tons.
100 feet	31,952
200 "	118,211
300 "	127,285
425 "	37,437
550 "	10,453
675 "	3,251
800 "	4,612
950 "	260
1,100 "	1,109
——	334,570

Of this amount 85.5 per cent. came from stopes and 14.5 per cent. from development. The amount of waste removed during the year was 42,424 tons.



The Canadian Mining & Finance Co., Ltd. Administration Building.
16th February, 1916.

The following figures show a comparison of expenditures for mining in the years 1913, 1914 and 1915:—

Year.	Exploration.		Development and Deferred Develop.		Production.		Total.	
	Amount.	Per Ton.	Amount.	Per Ton.	Amount	Per Ton.	Amount.	Per Ton.
	$ c.	$	$ c.	$	$ c.	$	$ c.	$
1913	13,230 59	0.096	137,375 38	0.993	274,688 23	1.986	425,294 20	3.075
1914	11,607 89	0.056	207,993 12	0.998	344,548 69	1.646	564,149 70	2.70
1915	13,468 46	0.040	240,435 07	0.718	477,187 32	1.425	731,090 85	2.183

The following unit costs are given as a matter of interest:—

Diamond drilling, including power, diamonds, labor	$1 60	per foot.
Crosscutting, including power, explosives, labor	6 40	" "
Shaft sinking, including power, explosives, labor	42 32	" "
Drifting, including power, explosives, labor	10 10	" "
Raising, including power, explosives, labor	16 17	" "
Winzes, including power, explosives, labor	39 20	" "
Stoping, including power, explosives, labor	0 70	" ton.
Mucking and tramming, power and labor	0 28	" "

The 1,100-foot level has been reached and No. 1 vein has been found to persist to that depth.

The main shaft has been completed to the 800-ft. level and ore may now be hoisted direct from that level.

During the month of April an electric locomotive haulage system was started underground. The result has been a saving of seven cents per ton in tramming costs. This amounts to a total of $26,389.58 saved.

Back filling of stopes with waste rock was started during the year, which has added slightly to working costs.

The price of explosives has advanced steadily, and this advance has increased the cost of mining by fifteen cents per ton over what it would be with normal prices ruling.

Most of the work of the year has been confined to the upper levels of the mine. A comparatively small amount of work has been done upon the 675 and 800-foot levels, but no attempt has been made to push development upon these levels owing to the large amount of territory to be covered on the upper levels.

During the year several discoveries of great importance to the mine have been made. Among these may be noted an ore body on the 800-foot level reached by a crosscut east of No. 1 Vein having a width of over 20 feet and an average value of over $10.00 per ton.

The Mill.

During the year the mill treated a total of 441,236 tons of ore of which 334,750 tons came from Hollinger and 106,486 tons from the Acme Gold Mines Limited.

Detailed information regarding the Hollinger treatment is given below:

MILLING RECORD.

Total ore milled	441,236
Less Acme ore milled	106,486
Tons of Hollinger ore milled	334,750
Average value per ton	$10 11
Total values sent to mill	$3,384,666 84
Average tons per day	917
Per cent. of possible running time	93.8%
Average tons per 24 hrs. of running time	978
Stamp duty tons per 24 hrs. of running time	14.72
Unrecovered values:—	
Concentrates stored for re-treatment	$81,763 00
Lost in tails	133,090 00
Total	214,853 00
Values recovered	3,169,813 84
Value per ton in tailings	0 40
Cyanide consumed per ton ore	0.574 lbs.
Lime consumed per ton of ore	1.896 "
Zinc consumed per ton of ore	0.467 "
Acid consumed per ton of ore	0.0032 "
Lead acetate consumed per ton of ore	0.0021 "
Tons of solution precipitated per ton of ore	1.909
Zinc added per ton of solution	0.244
Average value of pregnant solution	$5.074
Cost of treating Hollinger ore per ton	0.999

During the year the concentrate treatment plant was altered so that now concentrates are treated as produced and the values contained in the concentrates stacked during the past two years are steadily being reclaimed.

Early in the year the capacity of the mill was raised to 1,600 tons per day and during the latter part of the year extensions were commenced which will increase the capacity to 2,000 tons per day.

One hundred stamps are in regular operation and now extra tube-mills and screening plant are being installed, to which ore leaving the crushers small enough to be tube-milled will be by-passed thus relieving the stamps.

The continuous decantation plant is being increased by the addition of two rows of 40-ft. tanks. Six Dorr agitators, 26 ft. in diameter by 18 ft. deep, have been installed to secure a longer period of treatment for the ore. The concentrating plant has been re-arranged to make room for the agitators, and a tube mill has been installed in circuit with two smaller agitators for treating concentrates.

It is expected that by means of these alterations the capacity of the mill will be raised to 1,900 tons per day, and that a slightly improved extraction will be obtained owing to the increased agitation provided.

The alterations will probably not be ready for use before the first part of April.

COMPARATIVE COSTS PER TON FOR THE YEARS 1913, 1914 and 1915.

—	1913	1914	1915
Tons milled per day	379	584	917
Cost per ton of:—	$	$	$
Mining	3.09	2.10	1.89
Milling	1.63	1.22	1.00
General	1.38	1.10	.65
Depreciation	.88	.79	.44
Totals	$6.97	$5.21	$3.98

While increased efficiency is no doubt responsible for much of the reduction in cost, yet a very definite advantage is gained by the handling of larger tonnages.

Actual working costs have been reduced to $3.41 per ton and these would be still lower were it not for the enhanced value of supplies due to the war. The advanced price of explosives has already added ten cents per ton to the mining costs, and milling costs will be increased approximately seven cents per ton owing to the advanced price of zinc dust.

The underground system of electric locomotives has shown a reduction of seven cents per ton in tramming.

The stores department has handled approximately one million dollars worth of supplies during the year.

The average number of men employed during the year has been 735 on the following classes of work:—

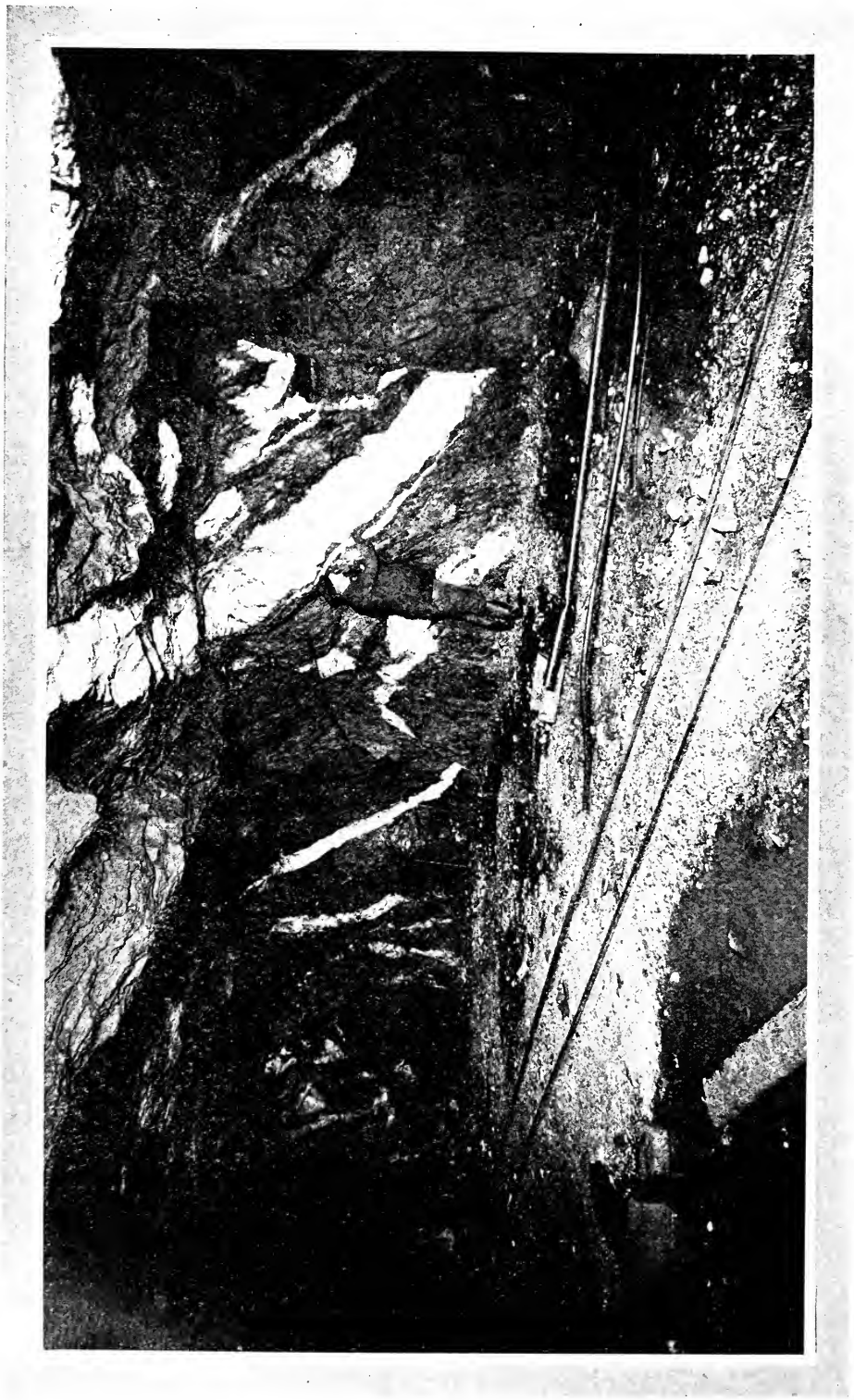
Miners—		Mechanics—			Millmen		98
Exploration	5	Operating	32		Refinery		5
Development	83	Maintenance	78		Engineering Staff	10	
Production	315	Construction	84		Clerical Staff	8	
	403		194		Miscellaneous	17	35
					Total		735

THE ACME GOLD MINES, LIMITED.

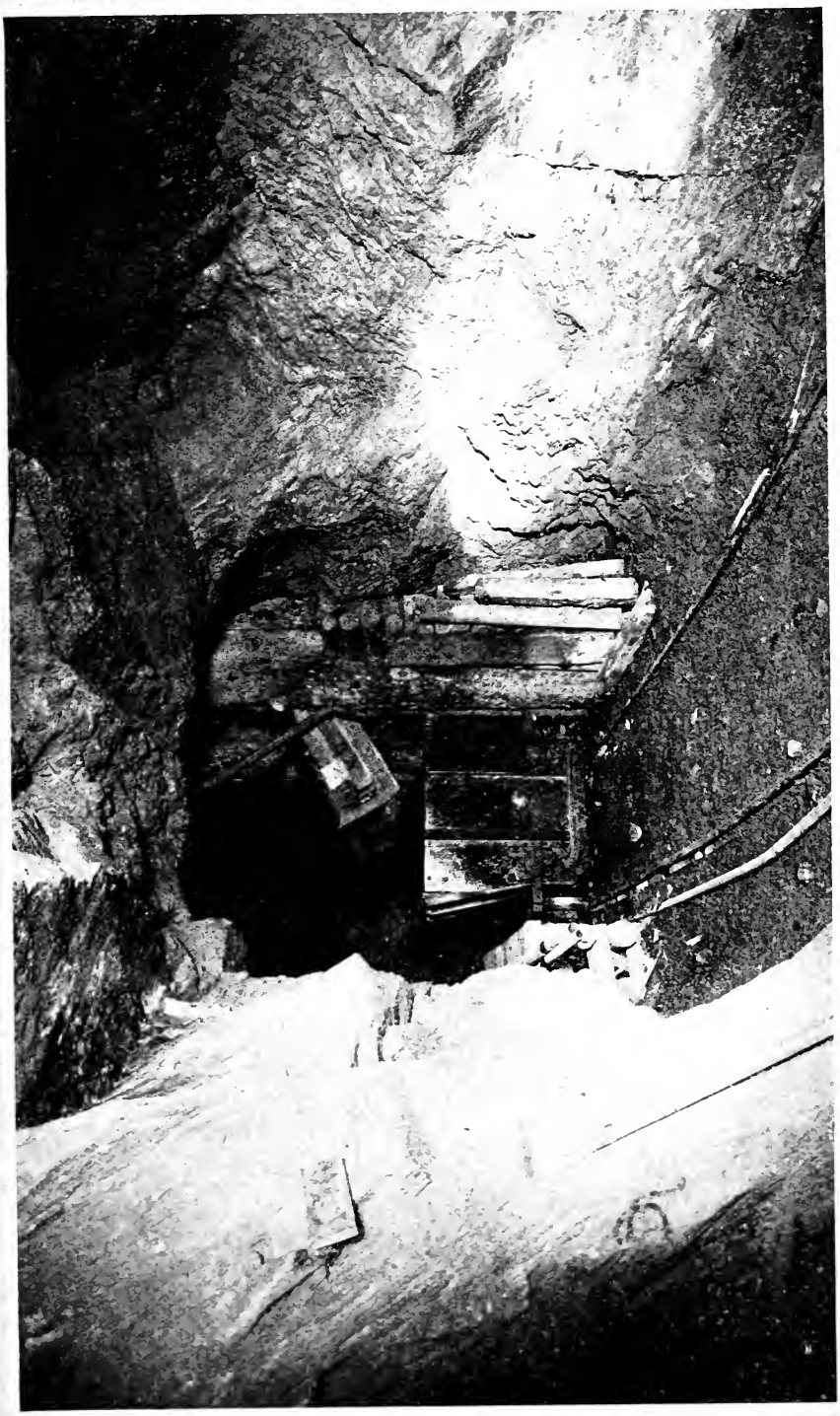
Production for the Calendar Year 1915.

Period Ending—	Tonnage Treated.	Gross Value.
		$ c.
January 28th		
February 25th		
March 25th	3,714	42,822 42
April 22nd	4,231	44,002 40
May 20th	10,291	98,381 96
June 17th	10,152	93,702 96
July 15th	10,652	98,424 48
August 12th	11,597	104,720 91
September 9th	11,559	104,377 77
October 7th	10,990	106,163 40
November 4th	10,495	108,518 30
December 2nd	11,214	123,241 86
December 31st	11,591	120,198 67
Total	106,486	1,044,555 13

The Dome Mines, Ltd. Open pit looking south, 250 feet wide.



The Dome Mines, Ltd. Sill floor of a shrinkage stope.



The Dome Mines, Ltd. Drawing level under shrinkage stope, showing chutes and 5-ton ore cars.

The Dome Mines, Ltd. Main haulage level, showing 5-ton cars.

THE DOME MINES COMPANY, LIMITED.

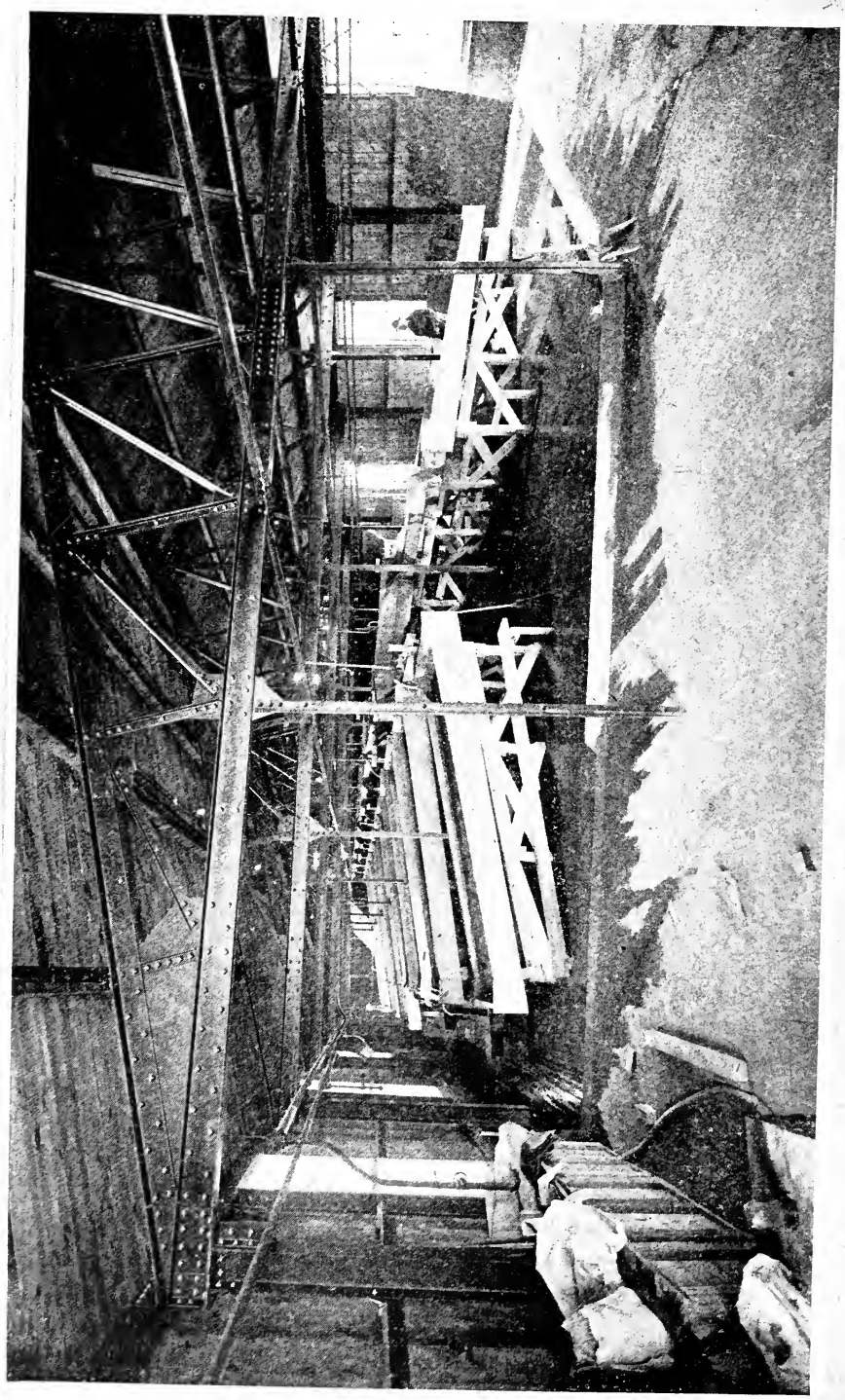
Production Record for Calendar Years 1914 and 1915.

	Ore Milled. Tons.	Ounces Gold Product.	Ounces Silver Product.	Value Gold Product.	Value Silver Product.	Total Value.	Recovery per ton.
1914				$ c.	$ c.	$ c.	
January	13,900	5,392.103	618.06	111,464 65	346 11	111,810 76	8.04
February ...	12,010	3,302.931	484.11	68,277 62	271 11	68,548 73	5.70
March	14,970	4,246.367	572.77	87,780 20	328 64	88,108 84	5.88
April	14,710	4,697.850	589.04	97,113 16	341 64	97,454 80	6.62
May.....	16,180	2,992.906	425.40	61,868 86	240 28	62,109 14	3.83
June	18,160	4,027.601	650.04	83,257 89	364 02	83,621 91	4.60
July	19,780	3,993.237	696.03	82,547 51	366 75	82,914 26	4.19
August	22,110	4,380.731	792.51	90,557 75	417 17	90,974 92	4.11
September..	21,940	4,781.808	848.93	98,848 71	441 45	99,290 16	4.52
October.....	22,500	4,608.783	941.49	95,272 01	464 50	95,736 51	4.25
November ..	22,040	4,585.121	950.53	94,782 84	456 26	95,239 10	4.32
December...	23,090	4,016.590	831.16	83,030 26	398 97	83,429 23	3.61
Totals..	221,390	51,026.028	8,400.07	1,054,801 46	4,436 90	1,059,238 36	4.78
1915							
January	23,220	3,975.957	729.570	82,190 31	350 19	82,540 50	3.55
February ...	21,600	4,061.863	706.280	83,966 16	339 00	84,305 16	3.90
March	23,220	4,713.879	873.250	97,444 47	436 62	97,881 09	4.21
April.....	23,630	4,567.746	879.610	94,423 73	439 80	94,863 53	4.01
May.....	26,000	5,360.761	889.500	110,816 79	444 75	111,261 54	4.28
June	27,200	5,823.976	870.160	120,392 25	428 94	120,821 19	4.44
July.....	28,300	6,345.575	900.487	131,174 66	432 24	131,606 90	4.65
August	28,600	6,473.406	1,037.230	133,817 19	487 49	134,304 68	4.69
September...	28,500	6,728.769	1,143.616	139,098 26	575 89	139,674 15	4.90
October	28,750	10,174.086	1,760.340	210,314 85	889 44	*211,204 29	.....
November ..	28,600	7,732.967	1,265.421	159,854 62	675 72	160,530 34	5.61
December...	30,120	7,766.957	1,334.315	160,557 23	735 63	161,292 86	5.35
Totals..	317,740	73,725.942	12,389.779	1,524,050 52	6,235 71	1,530,286 23	4.81

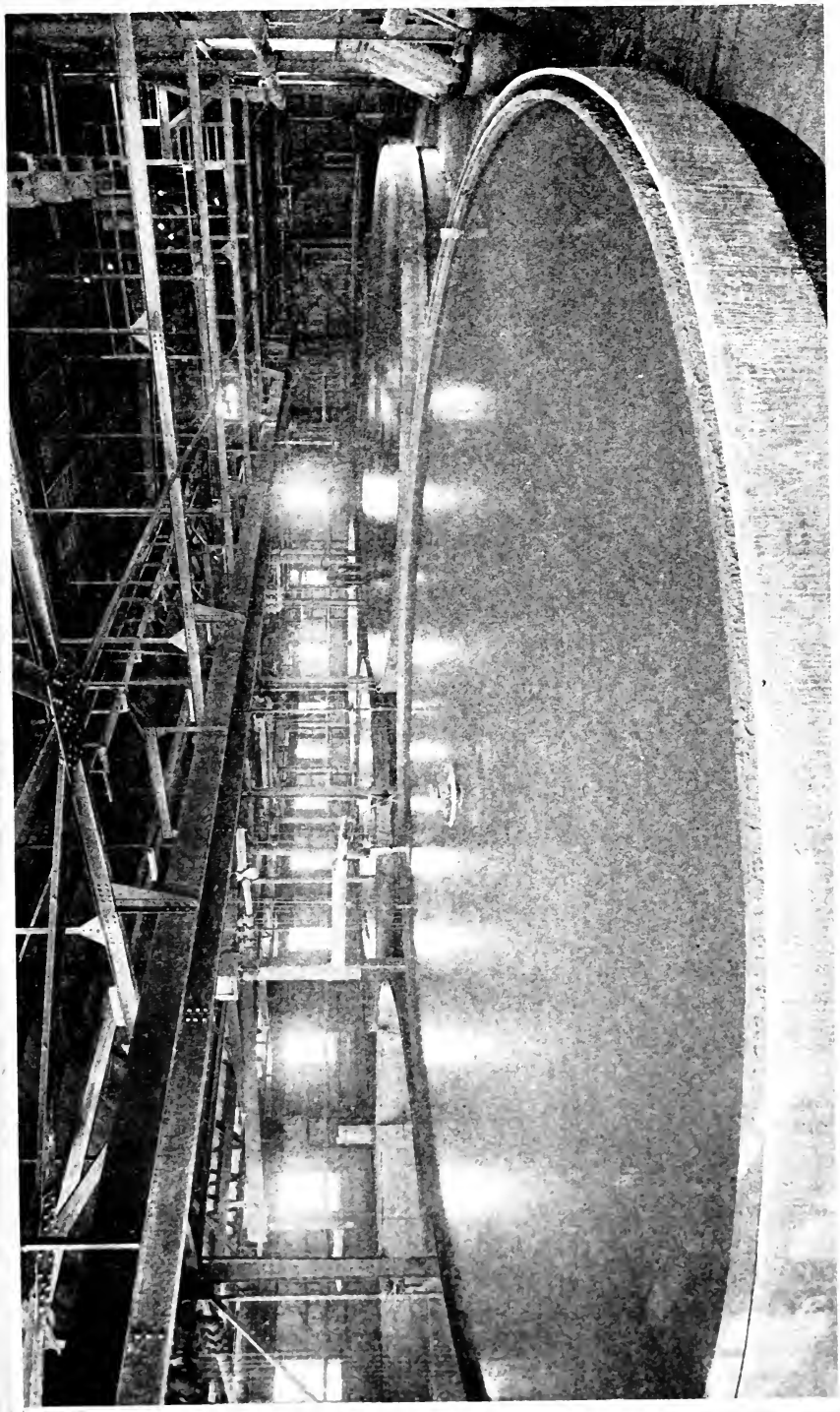
* This includes gold recovered from semi-annual clean-up.

A careful perusal of the above table shows a steady increase in the tonnage treated during the last two years. This increased tonnage is due to the bringing of the mill up to its maximum capacity and the partial completion of the extensions to the plant which will ultimately give it a capacity of 45,000 tons per month. During 1914 the increase in tonnage was made at the expense of the grade of the ore, which came mostly from the open pits. The increase in the value of the ore treated in 1915 is due to the higher value of ore coming from development work and the starting of stoping operations underground where the values are considerably in excess of the open pits.

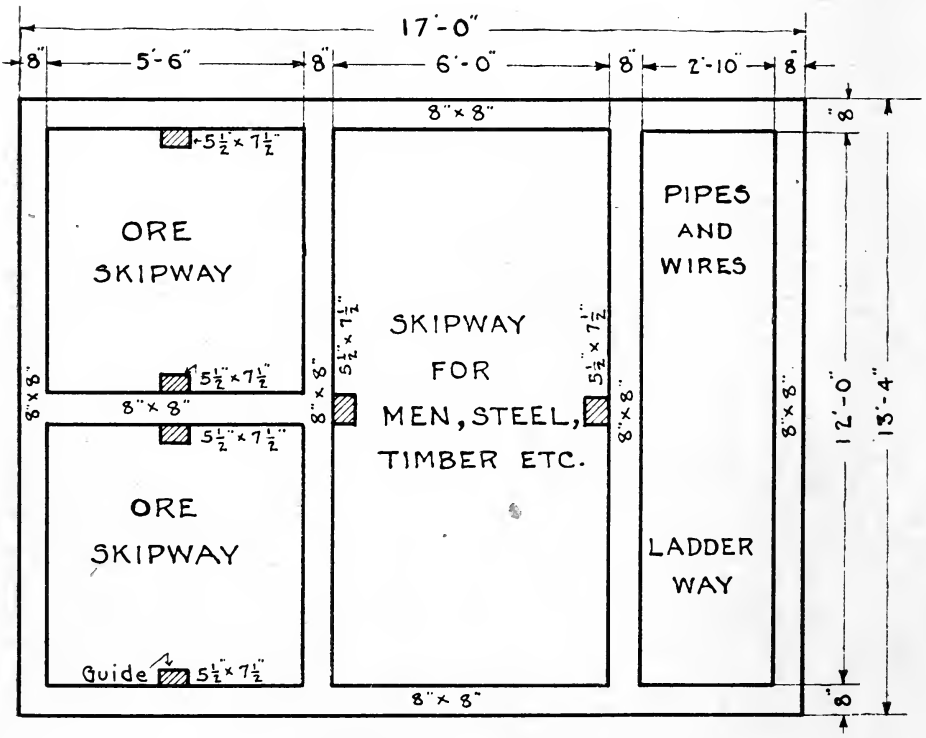
Provision is made for preliminary crushing underground by the installation of a Buchanan all-steel Jaw Crusher, 54 in. x 36 in. with a capacity of 250 tons per hour to 8 in., or 200 tons per hour to 6 in. This crusher is situated just below the fifth level so that all ore above the fifth level will be tributary to it. It is estimated that something over three million tons will ultimately pass through this installation. A large ore pass 10 ft. x 20 ft. in section has been constructed from the crusher station up to and above the third level, and the system is so laid out that trains of cars hauled by storage battery locomotives can be dumped into



The Dome Mines, Ltd. Amalgamating plate floor in mill.

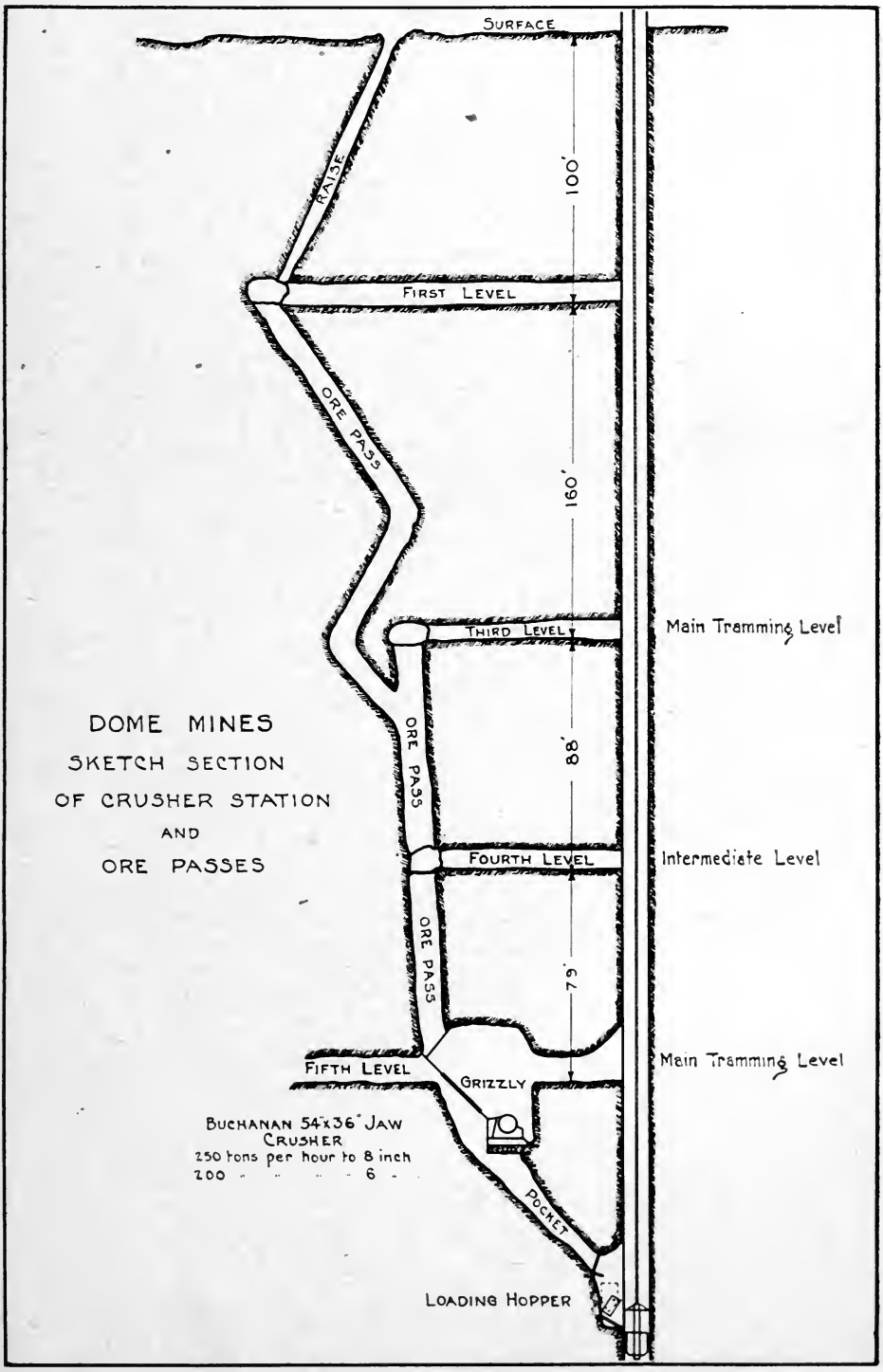


The Dome Mines, Ltd. Sand leaching section of mill.



DOME MINES

SKETCH PLAN OF NEW SHAFT


SURFACE
RAISE
100'
FIRST LEVEL
ORE PASS
160'
THIRD LEVEL
Main Tramming Level
DOME MINES
SKETCH SECTION
OF CRUSHER STATION
AND
ORE PASSES
ORE PASS
88'
FOURTH LEVEL
Intermediate Level
ORE PASS
79'
FIFTH LEVEL
GRIZZLY
Main Tramming Level
BUCHANAN 54"x36" JAW
CRUSHER
250 tons per hour to 8 inch
200 " " " 6 "
POCKET
LOADING HOPPER

this ore pass from any of the levels above the fifth. The fifth level ore trains will dump on to a chute which leads directly into the crusher. Underneath the crusher is a pass which carries the ore to a loading station on the sixth level, whence it will be conveyed by automatic arrangement to the pocket at the new No. 3 shaft. This pocket will hold about 500 tons and will be equipped with automatic loading hoppers to fill the 5-ton skips. From the surface ore bin to the secondary crusher station the haulage will be a head-and-tail rope with a 20-ton car.

A new vertical shaft was started on 1st November and by the end of the year was down 313 feet. It will contain two compartments for hoisting ore, one larger compartment for men and supplies, and a fourth compartment to contain pipes, ladder-way, etc. (See sketch.)

The central compartment being 6 ft. x 12 ft., drills and drill-steel can be handled on the man-cage in it without upending, and it is large enough also to handle without inconvenience the electric locomotives and 5-ton cars to be used underground when required to be moved for repairs or for any other reason. Above this shaft will be erected a 125-foot steel headframe.

The new rock hoist to be installed will have a capacity of 100,000 tons per month. More air compressors are being added and the switchboard capacity is to be doubled.

The capacity of the mill has gradually been increased till at the end of the year it was about 1,000 tons per day. Work of further enlarging the capacity of the mill to treat 1,500 tons per day was at that time about seventy-five per cent. completed. The first considerable increase in tonnage will be in January, 1916.

To make this change the following additions are being made to the mill:

2—8′ x 30″ Hardinge Ball-Mills.
2—5′ x 22′ Tube-Mills.
2—90 Frame Merrill Presses.
3—10′ x 30′ Dorr Thickeners.
2—8′ x 45′ Pachuca Tanks.
2—12′ x 40′ Sand Leaching Tanks.

These additions, which will increase the monthly capacity of the mill by 17,000 tons, are expected to be completed by April 1st, 1916.

McIntyre-Porcupine Mines, Limited.

Record of Production for 1915.

Period.	Tons milled.	Value per ton.	Gross value.	Recovery %	Operating cost per ton.	Operating profit.
		$ c.	$		$ c.	$
1st Quarter	23,445	6 85	184,014	96.3	5 02	59,488
2nd "	25,410	7 87	200.030	96.0	4 44	79,031
3rd "	26,940	7 82	210,706	95.9	4 27	87,140
4th "	26,160	7 39	193,261	95.4	4 16	75,485
Totals and averages	101,955	7 73	788,011	95.9	4 45	301,144

In August this company acquired the McIntyre Extension, an adjoining property formerly known as the Pearl Lake Mine, and in October a controlling interest in the Jupiter was acquired. The McIntyre Extension shaft has been sunk from the 665-foot level to the 900-foot level and this is to be extended to 1,080 feet. It is the intention to drive from this shaft on the 600-foot level into the Jupiter and to connect the 1,000-foot level with McIntyre No. 5 shaft. This is to be the main working shaft for the consolidated properties. The development in the McIntyre property during the year has been the sinking of No. 4 shaft from the 400-foot to the 600-foot levels, and No. 5 shaft from the 400-foot to the 700-foot levels, and the opening up of the new levels thus reached. The average daily tonnage of the mill is now 300 tons. A new unit is under construction and nearing completion, which will add a further 150 tons to the daily capacity.

Porcupine Crown Mines, Limited.

Development.

Total development was 4,476 feet for 1915.

—	Prior to 1915.	1915.	Total to date.
Drifting	3,778	1,795	5,570
Crosscutting	4,997	2,146	7,143
Raises and Winzes	1,780	535	2,315
Totals	10,555	4,476	15,028

The main shaft was raised from the 500-foot level to the 400-foot level, making a total depth of 500 feet.

Additions to ore reserves were made on the 200, 300, 400, 500, 600 and 700-foot levels.

Considerable diamond drilling was done which successfully picked up the vein after faulting.

The 700-foot level is reached by a winze on the vein from 500-foot level. This winze will be used as a temporary hoisting shaft till enough ore has been blocked out on the sixth and seventh levels to warrant a further sinking of the main shaft.

Production.

Net value bullion marketed after deducting mint charges was $599,734.77.

Actual gold production of mill was $599.501.57.

Thirty-four thousand six hundred and eighty tons of ore were broken in the stopes and 5,848 tons of ore were broken in development.

Twelve thousand four hundred and ninety-six tons of waste were broken and hoisted to the waste dump.

Milling.

Crushed	41,326 tons
Average value heads	$14 51
Average value tails	0 34
Average value recovered	14 17
Extraction	97.67%

Besides the ore treated, 5,093 tons of tailing which had passed through the original amalgamation mill without cyaniding, were treated during the summer in the cyanide plant. While re-treating this tailing the daily capacity of the mill was raised from 125 to 185 tons. This was done without interfering with the regular working of the mill as the cyanide equipment has sufficient capacity for the extra tonnage. There is still over 7,000 tons of this tailing to be treated. On this tailing, upon which an original extraction of 85 per cent. had been made, a further extraction of 85.77 per cent. of the remaining 15 per cent. was made.

No changes of any kind were made in the milling practice.

It is notable that although the grade of the ore was somewhat lower than that of the previous year, the extraction was better.

Costs of Operation.

Mining	$1 97	per ton milled.
Development	0 72	" "
Prospecting	0 69	" "
Diamond drilling	0 17	" "
Milling	1 46	" "
General	1 32	" "
Depreciation, insurance, taxes, compensation, head office, etc.	1 24	" "
Total	$7 55	

Total revenue		$601,742 01
Operating expenses	$262,501 31	
Head office account	51,337 27	
Net profits		$287,903 43
Dividends		240,000 00
		$37,903 43

Ore Reserves.

During the year approximately 60,000 tons of ore were developed of such grade that there has been no depletion of ore reserves by the drawage. The grade developed is lower than that previously blocked out, the gold in the extension of the vein south of the "Main Fault" being more disseminated through the wall rock.

The lowest level of the mine, the 700, was reached in 1915 and only a short drift has been run on the vein, but the prospect is encouraging.

SUMMARY FOR 1915.

Period.	Average daily tons.	Tons in month.	Heads value. Total.	Heads value. Per ton.	Tails value. Total.	Tails value. Per ton.	Produced. Total.	Produced. Per ton.	Produced. % Ext.
			$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	
January ..	121.6	3,769	53,364 97	14 15	1,076 15	0 28	52,288 82	13 87	98.02
February .	125.3	3,510	67,087 77	19 11	1,061 30	0 30	66,026 47	18 81	98.47
March	84.2	2,612	51,489 33	19 71	708 56	0 27	50,780 77	19 44	98.63
April. ...	101.7	3,052	57,561 91	18 86	854 52	0 29	56,707 39	18 58	98.51
May.....	131.4	4,072	64,741 21	15 89	1,027 86	0 25	63,713 35	15 61	98.23
June.....	.....	P.T.198	P.T.623 70	.....	P.T.69 62	....	P.T.554 08	.....	.....
	124.4	3,732	50,320 13	13 49	1,093 87	0 30	49,226 26	13 19	97.77
July	.....	P.T.1,154	P.T.3,635 51	.....	P.T.426 92	....	P.T.3,208 59	.....	.....
	97.8	3,034	36,943 32	12 17	1,113 01	0 37	35,830 31	11 80	96 95
August ...	91,3	P.T.2,538	P.T.7,995 85	.....	P.T.1,222 45	....	P.T.6,773 40	.....	.....
	.....	2,832	36,529 80	12 89	1,384 06	0 48	35,143 74	12 41	96.27
September	106.3	P.T.1,203	P.T.3,789 45	.....	P.T. 564 57	....	P.T.3,224 88	.....	.....
	.....	3,189	33,202 34	10 41	1,372 77	0 43	31,829 97	9 98	95.86
October...	118.7	3,680	69,745 69	18 95	1.362 69	0 37	68,383 00	18 58	98.00
November.	126.8	3,803	56,683 36	14 90	1,401 70	0 37	55,281 66	14 53	97.51
December.	130.3	4,041	21,967 32	5 44	1,440 44	0 35	20,526 88	5 09	93.56
Totals..	113.2	41,326	599,637 15	14 51	13,896 53	0 34	585,740 62	14 17	97.67
	.....	P.T. 5,093	16,044 51	3 15	2,283 56	0 45	13,760 95	2 70	85.77

P.T. (Pond Tailing from Amalgamation Mill—Cyanided.)

PORCUPINE VIPOND MINES, LIMITED.

Development.

During the year the 200-foot level was extended to the west limit of the North Vipond Lot, demonstrating the continuation of the ore-bearing zone to that point.

A two-compartment vertical winze was sunk from the 300-foot level, 220 feet and stations were cut at the 400 and 500 points. A cage has been installed in the winze and exploration work is being carried on on the 400-foot and 500-foot levels. The drifts will be carried to a point under the main working shaft and connection made with it.

A summary of the total development work to date follows:—

—	To 1915	1915	Total.
Sinking and raising	795.0	381.5	1,176.5
Drifting	2,902.4	1,198.9	4,101.3
Crosscutting	1,757.9	218,6	1,975.6
Total.....	5,454.4	1,799.0	7,253.4
Diamond drilling.....	.....	524.0	524.0

Production.

			Per ton.
Ore treated	35,899 tons.		
Gold bullion produced	11,921.15 fine oz.	$246,410 32	
Silver bullion produced	1,455.39 fine oz.	713 73	
Total value recovered		247,124 05	$6 89
Total value tailings		22,543 37	0 62
Gross value ore treated		269,667 42	7 51
Percentage extraction			91.7%

Tonnage milled was drawn from the following:

Stopes	31,598 tons.
Development	4,077 tons.
Dump	224 tons.
Total	35,899 tons.

Ore Reserves.

The estimated ore reserves amount to 90,000 tons of a gross value of $587,280.00, of which 17,130 tons valued at $93,000.00 is broken and stored in stopes.

SCHUMACHER GOLD MINES, LIMITED.

Underground, the shaft was sunk from 326 feet to 624 feet and stations cut at 400 feet, 500 feet and 600 feet. 1,086 feet of crosscutting has been done on the 300-foot, 400-foot, and 600-foot levels, 436 feet of driving has been done, principally on the 300-foot and 400-foot levels, and 293 feet of raising on the 100-foot and 200-foot levels.

Surface.

A 150-ton counter-current decantation cyanide plant was built and started operations on September 1st. From that time to the end of the year it treated 9,240 tons.

December costs were as follows:

Milling costs	$0.997
Mining costs	3.533
Total costs	$4.53

This includes all items except depreciation.

An assay office and a refinery were built and equipped and crusher and conveyor building erected. An addition was also made to the power house to contain a new 100 h.p. return tubular boiler and a 744 cu. ft. cross compound compressor. A dry house was also built and a new office building is nearly completed.

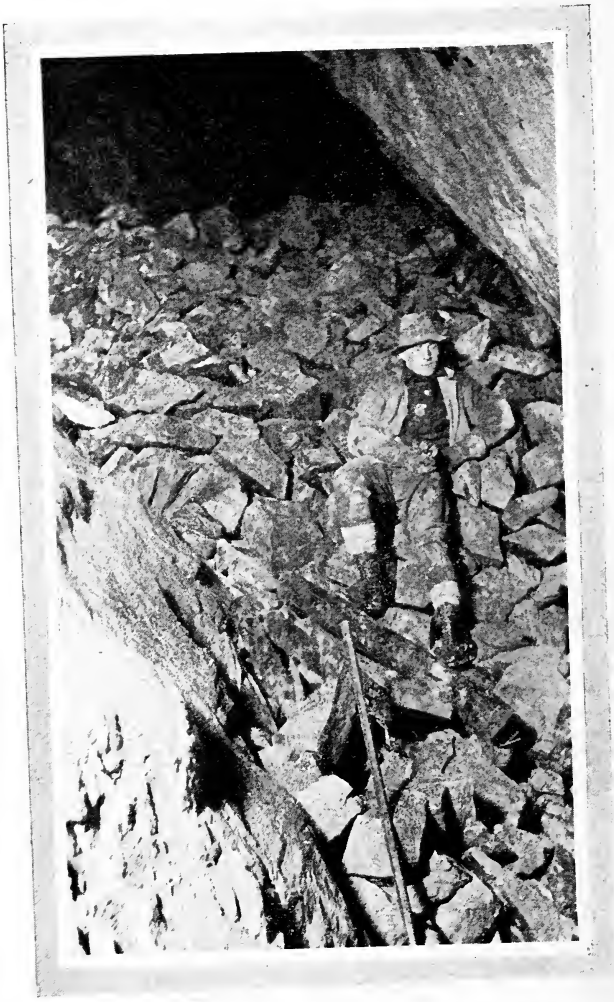
DOME LAKE MINING AND MILLING COMPANY.

Underground work during the year has been encouraging. Development work was:—

Drifting	796.5 feet.
Crosscutting	135.0 feet.
Sinking	68.9 feet.
Raising	157.0 feet.

The little mill ran more or less continuously throughout the year, a considerable part of the ore treated coming from development. The ore was crushed

Headframe—Tough-Oakes Gold Mines, Ltd.—Kirkland Lake, Ont.



Tough-Oakes Mine, Kirkland Lake, Ont. Stope 9 ft. wide, 200 ft. level, west drift. No. 2 vein.

in a Blake crusher and fed to stamps, then to a tube-mill where most of the amalgamation was done. The discharge went over first set of copper plates, then to Dorr Classifier, the coarse going to tube-mill and slimes over second copper plate to concentrating tables. These concentrates have been shipped to the smelter, but the company has now decided to treat all ore on the property and has placed an order for a small cyanide plant which is to be installed early in 1916.

The milling and shipping record for 1915 is as follows:

Tons of ore milled	11,727.6
Gold content of same gross	106,989.20 oz.
Bullion shipped	3,966.86 oz.
Gold content of same	3,407 oz.
Value of fine gold	$70,439.91
Silver content of bullion	516.13 oz.
Value of silver	$251.15
Concentrates produced, 1915	221.64 tons.
Estimated gold content of same	$15,810.56
Concentrates shipped	193.34 tons.
Gold content of same	770.65 oz.
Silver content of same	337.94 oz.
Value of silver in concentrates shipped	$167.42
Average value of bullion shipped	$17.82

North Thompson (Associated) Gold Mine, Limited.

Development during 1915 at the North Thompson (Associated) Gold Mine has been quite encouraging. A three-compartment shaft has been sunk 300 feet and three levels, 100 feet apart, opened up with satisfactory results at each level, the richest ore being found at the 300-foot level. The mine footage completed is 3,550. The company intends to start the erection of a mill during 1916.

Sesekinika

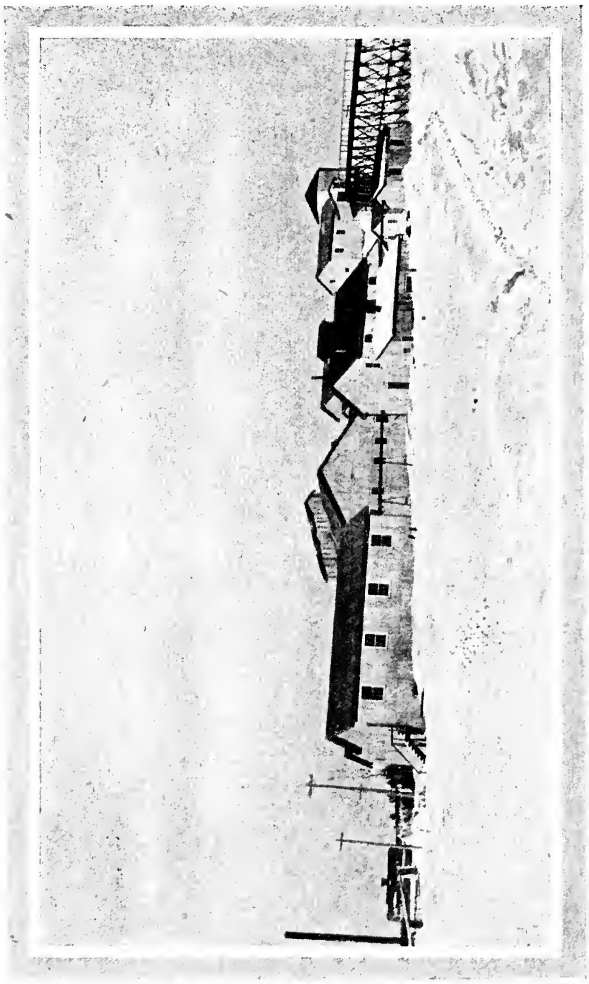
Very little development outside of assessment work was done in this district during the year. The surface work on the Smith-Labine claim showed up a number of new and promising veins, and late in the year an option on this property was taken up by the Kerr Lake Company, and active development is now planned.

Swastika

The mine and equipment of the *Swastika Mining Company* was bought at a liquidator's sale by F. L. Culver *et al.* The shaft has been de-watered for the purpose of making an underground examination. An examination of the surface will be made in the spring after the snow is gone.

DIVIDENDS PAID BY PORCUPINE AND KIRKLAND LAKE GOLD MINES.

Mining Company.	Percentage paid during 1915.	Amt. of Dividends and Bonuses paid during 1915.	Total percentage paid to Dec. 31st, 1915.	Total amount of Dividends and Bonuses paid to Dec. 31st, 1915.
Hollinger	52	$1,560,000 00	139	$4,170,000 00
Dome	10	400,000 00	10	400,000 00
Porcupine Crown	12	240,000 00	21	420,000 00
Rea	6	12,000 00	6	12,000 00
Tough-Oakes	2.5	66,437 50	2.5	66,437 50
	—	2,278,437 50	—	5,068,437 50



Tough-Oakes Mill, Kirkland Lake, Ont.

KIRKLAND LAKE.

Tough-Oakes Gold Mines, Limited.

During the year all mining development was carried on underground. At the close of 1915 the shaft on No. 2 vein was down 300 feet, and the fourth level was opened up by a winze. On the 200-foot level a crosscut was driven north for 800 feet, which intersected Veins 3, 6, 7 and 8. On No. 3 vein, 250 feet of drifting has been done and a winze sunk 100 feet west of the crosscut to the 300-foot level. From the 116-foot level on No. 6 vein, 250 feet east of "B" shaft, a winze was put down 70 feet with very good results. The development record for the year was:

Shafts and winzes	224 feet
Drifting	1,608 feet
Crosscutting	947 feet
Raises	428 feet

Unusually low water conditions at the power plant at Charlton necessitated the curtailment of much work. The motor compressor was shut down about four and a half months. In November an auxiliary air compressor with a capacity of 1,265 cubic feet of air per minute, at 100 lbs. pressure, was installed. This compressor is suitable for steam or electric drive.

About half the underground force can be run with the auxiliary steam plant.

The 5-stamp mill to which was added an 8-foot Hardinge pebble mill was in operation from January until the middle of March and produced the following:

Tons milled.	Assay value per ton.	Gross value by assay.	Bullion produced.	Assay value tails.	Gross value tails.	% Extraction.
1,350	$27 78	$37,408 55	$14,802 13	$14 68	$19,768 09	42.8

Crushing in new 100-ton cyanide mill started March 15th, 1915, slightly over three years from the date of discovery of gold on the property and twenty-nine months from the start of mining operations.

The mill is located 1,000 feet north of main shaft and the ore is delivered along an inclined trestle by a self-dumping skip.

The crusher station occupies a separate building connected with the cyanide plant by an overhead conveyor.

*In the crusher station run-of-mine ore is reduced to 1¼-inch ring by two jaw crushers, with intermediate elevating and screening. The crushed ore is delivered by belt conveyor to the fines-storage bin at the end of the fine-grinding department. From it push feeders deliver to a short conveyor feeding the ball mill. The ball mill product flows over a cocoa matting table into a duplex Dorr Classifier, which feeds the No. 1 tube-mill, (5 ft. x 20 ft.) and crushes in tandem with the No. 2 tube-mill (5 ft. x 20 ft.). The second duplex Dorr Classifier operates in closed circuit with the No. 2 tube-mill. The overflow of each classifier runs by gravity into a 30 x 10-ft. Dorr thickener. The overflow of this machine,

*Extract from E. & M. Jrnl., November 27th, 1915, page 870.

LAYOUT OF THE TOUGH-OAKES MILL
KIRKLAND LAKE
ONTARIO.
December 4th 1915.
50 000 gal Water Tank
Crusher Station
Crushing Solution Tank
Store
Office
Tresite
Oil Store
ROAD
Lime Bin
Ball Crusher
Lime Ore Bin
Primary Dorr
Dress Floor
AGITATORS
THICKENERS
Pump Floor
Sumps
Refinery
Transformers
Feeder Line
2200-v Mill
Heating Plant
Swamps
Sloping Rock
Carpenter's Shop
Machine Shop
Swamps

constituting the pregnant solution, gravitates to a box containing canvas leaves for clarifying. From this a vacuum pump delivers the clear solution to a sump, from which it is drawn for precipitation. The zinc-dust system is used.

Thickened pulp from the bottom of the 30 x 10-ft. collector thickener is transferred by a diaphragm pump to three 16 x 12-ft. agitators operating continuously in series. The pulp from the third agitator gravitates to the first of four 28 x 10-ft. Dorr thickeners, operating on the continuous counter-current decantation principle. Each tank is 24 inches higher than the preceding one. The overflow runs by gravity, while the thickened-pulp transfers are effected by diaphragm pumps. From the final tank the thickened pulp is discharged by a diaphragm pump into a launder whence it runs through a mechanical sampling device and then to waste.

The total cost of the entire mill construction was $121,820.22 of which direct labor cost was $31,282.01 or 39 per cent.

Refining is done entirely in a tilting furnace without preliminary acid treatment. The gold and silver bullion produced averages about $13.00 per ounce.

The production for 1915 was:

Tonnage treated.	Gold, Fine, Oz.	Value.	Silver, Fine, Oz.	Value.	Total Value.	Value recovered, per ton.
		$ c.		$ c.	$ c.	$ c.
26,196	26,658.23	551,069 07	8,922	4,470 07	555,539 14	21 20

Teck-Hughes Gold Mines, Ltd.

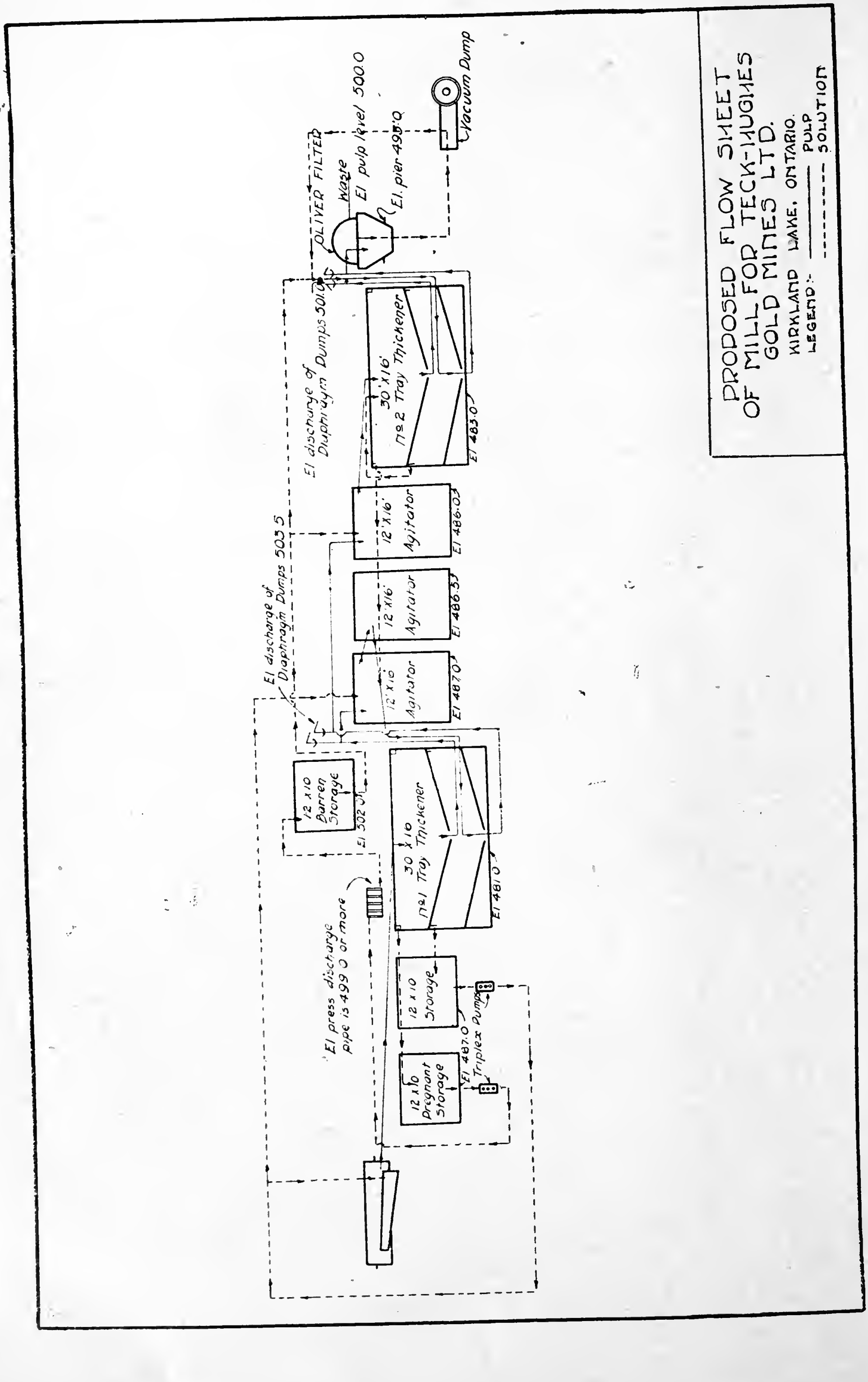
The stock control of Teck-Hughes Gold Mines, Limited, Kirkland Lake, Ont., was acquired in the fall of 1915 by the interests operating the Buffalo Mines, Ltd., Cobalt. Under the direction of Thos. R. Jones, General Supt., and L. W. Ledyard, Supt., work was immediately started on a cyanide plant of fifty tons daily capacity.

The mill represents a slight deviation from the general practice of slime treatment in Ontario. Certain changes in the general practice were considered advantageous owing to the richness of the ore to be treated and the difficulty with which Kirkland Lake ores are cyanided.

The primary crushing is to be done in a 16 in. x 10 in. crusher of the Blake type. The ore is then conveyed to a storage bin from which it is fed to a 5 ft. x 5 ft. ball-mill. The discharge from the ball-mill goes to a Dorr classifier and 5 ft. x 20 ft. tube-mill in closed circuit. The overflow from the classifiers is conducted through the slime plant completing the treatment.

Continuous agitation in Dorr tanks is used and the solution is changed on the pulp when the agitation period is two-thirds over. By this removal of the solution high in gold and by the addition of an active barren solution, an additional recovery of values is anticipated.

The dissolved values are removed by counter-current decantation in Dorr tray thickeners, followed by a short wash in an Oliver revolving filter. By the use of trays a given washing effect is secured by the use of one-half the number of tanks required for the ordinary thickeners installation. The filter is expected to materially reduce the mechanical loss of cyanide as well as to effect an additional recovery of the dissolved gold over what would be obtained by thickeners


PROPOSED FLOW SHEET
OF MILL FOR TECK-HUGHES
GOLD MINES LTD.
KIRKLAND LAKE, ONTARIO.
LEGEND:- PULP
SOLUTION
Vacuum Dump
OLIVER FILTER
Waste
El pulp level 500.0
El. pier 495.0
El discharge of Diaphragm Dumps 501.0
30' X 16' No 2 Tray Thickener
El 483.0
12' X 16' Agitator
El 486.0
12' X 16' Agitator
El 486.5
12' X 16' Agitator
El 487.0
El discharge of Diaphragm Dumps 503.5
12 x 10 Barren Storage
El 502.0
30' X 10 No 1 Tray Thickener
El 481.0
El press discharge pipe is 499.0 or more
12 x 10 Storage
Triplex Pumps
El 487.0
12 x 10 Pregnant Storage

alone. This feature of the plant is especially advisable due to the high gold content of the solutions and the relatively high strength of cyanide necessary.

The plant is now (April, 1916) practically completed and will be ready to start as soon as electric power reaches the property, which will be early in the summer.

The Lake Shore Mines, Limited.

The Lake Shore Mine, situated on the south shore of Kirkland Lake, had at the end of 1915 the following development.

A vertical shaft was continued from a depth of 120 feet to 315 feet during the year and three levels opened up at 100, 200 and 300 feet.

100-*foot level.* Of the 368 feet of drifting, over 200 passed through ore. One hundred and twenty feet of this ore shoot averaged $20.00 per ton over a width of four feet, the remainder is lower grade but will give small profits on milling.

200-*foot level.* Work consists of 370 feet of crosscutting and drifting, but owing to faulting little ore was developed, but its consistent values and continuity were proved by diamond drilling.

300-*foot level.* The ore shoot here shows greater width but lower values. Of the 165 feet of drifting, 100 feet is in ore of a grade that will give small working profit. Diamond drilling also under Kirkland Lake located several promising veins.

Goodfish

A number of promising discoveries have been made on claims in the vicinity of Goodfish Lake, which is situated near the north-east corner of the Township of Teck. An option on some claims known as the *Gibson Claims* was taken up and a company formed under the name of "*LaBelle Kirkland Mines, Limited.*" The holdings of this company consist of seven patented claims in Teck and Lebel. Development was prosecuted as far as feasible by hand and then a small plant consisting of the following was installed:

2 Boilers, Robb Mumford, 60 h.p. each.
1 Compressor, Ingersoll Rand, 460 cu. ft.
1 Hoist, Ingersoll Rand, 8 x 12.

An inclined shaft was sunk 140 feet on a vein in a contact between quartz porphyry and basalt. On the 100-foot level 70 feet of drifting and crosscutting has been done. The ore is a gold-bearing quartz with finely disseminated molybdenite in streaks, some of which have a maximum width of 1½ feet. The streaks occur in a zone 20 feet wide.

The *Costello Claim* situated in the south-west corner of Morrissette has a shaft down 50 feet.

Diamond drilling is proceeding on the *McGuire* property.

Munro

After many disappointments a producing property has been found in Munro Township, which is known as the *Dobie-Leyson Claim.* The company is now incorporated under the name of "*The Croesus Gold Mines Limited.*" A white quartz vein lying at an angle of 27° has been developed by a shaft sunk 250 feet on the slope. Some of the ore is very spectacular. The vein left the shaft a little above the 150-foot level, but was picked up again in crosscuts at the 150-

foot and 200-foot levels, where it shows rich spots similar to the original ore in the shaft. The vein averages 18 inches to 2 feet in width. Two tons of ore were shipped which produced $83,500 in gold and it is estimated that there remains in the dump and rejects an additional $40,000. This was produced in the first 110 feet of shaft sinking. The property is being developed with a small steam plant and is also being diamond drilled. It is situated about eleven miles east of the Town of Matheson.

Boston Creek

To the east of mileage 153½ on the T. & N. O. Railway development was started on several gold prospects during the summer.

The R. A. P. Syndicate commenced operations during August on a property about three-quarters of a mile east of the railway in Boston Township. A shaft was put down 100 feet by hand and then operations were suspended while a small plant was installed consisting of:

1—60 H.P. Locomotive Boiler.
1—3-drill Compressor.
1—6" x 8" Jenckes Hoist.

A pumping plant consisting of a 40 h.p. boiler and a 10 in. x 12 in. Fairbanks Duplex Pump was also installed.

The Dominion Reduction Company did some prospecting work on the Giovanazzo Claims north of the R. A. P. Syndicate, but operations were suspended in December. Several other claims further east show free gold, the most promising being the McDonough in the Sixth Concession Pacaud, about three miles east from Mindoka station. This is now known as the *Miller Independence Mines.* A small plant, consisting of a boiler, compressor, hoist, and a one-stamp Nissen Mill have been installed. Shaft sinking has been started on a very persistent quartz vein averaging about twelve inches in thickness and carrying good gold values in places. The vein was very flat lying at an angle of about twenty degrees, but it was found to straighten up as a little depth was attained.

Kowkash

On August 21st, 1915, E. W. King Dodds made a spectacular gold discovery while walking over a rocky hill below Howard Falls on Kowkash River. The discovery is nine miles north westerly from Kowkash station on the National Transcontinental Railway, 297 miles west of Cochrane. The news of the find caused a rush of about 400 prospectors to the neighborhood and from 75 to 100 claims were staked within three weeks. Development will proceed on the *Dodds Claim* during the winter, but throughout the rest of the district very little development will be started before next spring.

SILVER

The Market.

The metal silver has stood alone as the only metal whose price has been adversely affected by war conditions. During 1915 sales were mostly confined to United States, Canada and Mexico. Unsettled internal conditions affected the delivery of silver from Mexico during the early months of the year and this offset the diminishing demand for silver, so that the price showed only small variations.

Eastern demands were fairly large at the commencement of the year, but these gradually fell off and from spring till midsummer prices gradually sagged.

The lowest price of the year was reached in London on July 29th, 22-5/16 pence, and in New York on September 1st, 46¼ cents.

Purchases by the French and United States governments for minting in September and by the British Government in October tended to steady the price and by the middle of November it was found that supplies on hand in London were shorter than had been estimated. This, in conjunction with an awakened interest in the east, caused a rapid rise in price, rising from 51½ cents November 20th to 56½ November 27th.

The year closed with much of this gain still retained in spite of heavy selling from China. Larger quantities than usual were acquired by the different governments during the year for coinage purposes, the British Government alone buying nearly 28,000,000 ounces, but this was necessitated by the restricted circulation of gold coinage.

The monthly average price of silver in New York and London is shown in the following table:

Month.	New York.			London.		
	1913	1914	1915	1913	1914	1915
January	62.938	57.572	48.855	28.983	26.553	22.731
February	61.642	57.506	48.477	28.357	26.573	22.753
March	57.870	58.067	50.241	26.669	26.788	23.708
April	59.490	58.519	50.250	27.416	26.958	23.709
May	60.361	58.175	49.915	27.825	26.704	23.570
June	58.990	56.471	49.034	27.199	25.948	23.267
July	58.721	54.678	47.519	27.074	25.219	22.597
August	59.293	54.344	47.163	27.335	25.970	22.780
September	60.640	53.290	48.680	27.986	24.260	23.591
October	60.793	50.654	49.385	28.083	23.199	23.925
November	58.995	49.082	51.714	27.263	22.703	25.094
December	57.760	49.375	54.971	26.720	22.900	26.373
Year	59.791	54.811	49.684	27.576	25.313	23.675

New York Quotations—Cents per ounce troy, fine silver.
London—Pence per ounce, sterling silver, 0.925 fine.

The yearly average price of silver for the thirteen years in which the Cobalt Camp has been in operation is shown in the following table:

Year.	New York.	London.
1903	52.221	24.750
1904	57.221	26.375
1905	60.352	27.812
1906	66.791	30.875
1907	65.327	30.188
1908	52.864	24.375
1909	51.503	23.687
1910	53.486	24.625
1911	53.304	24.563
1912	60.835	28.031
1913	59.791	27.563
1914	54.811	25.313
1915	49.684	23.675

New York Quotations—Cents per ounce troy, fine silver.
London—Pence per ounce, sterling silver, 0.925 fine.

Pumping of Cobalt Lake, looking south.

Pumping of Cobalt Lake, looking east.

Cobalt

Geology.

The silver deposits of the Timiskaming District may be divided into three groups according to their position relative to the diabase sill:

1. Above the sill.
2. In the sill.
3. Below the sill.

The veins of most of the producing mines fall within group 3. In other words groups 1 and 2 are missing due to erosion. Such are those on the Coniagas, Nipissing, Hudson Bay, Tretheway, Buffalo, Mining Corporation, LaRose and McKinley-Darragh around Cobalt Lake and Kerr Lake, Crown Reserve, Drummond, Lawson at Kerr Lake. One of the Kerr Lake veins, however, belonged to group 2 as it occurred in the diabase. Other examples of group 2 are the King Edward, Silver Cliff and some of the O'Brien veins. In the outlying camps good examples of group 2 are the Wettlaufer of South Lorrain, and Miller Lake O'Brien of Gowganda.

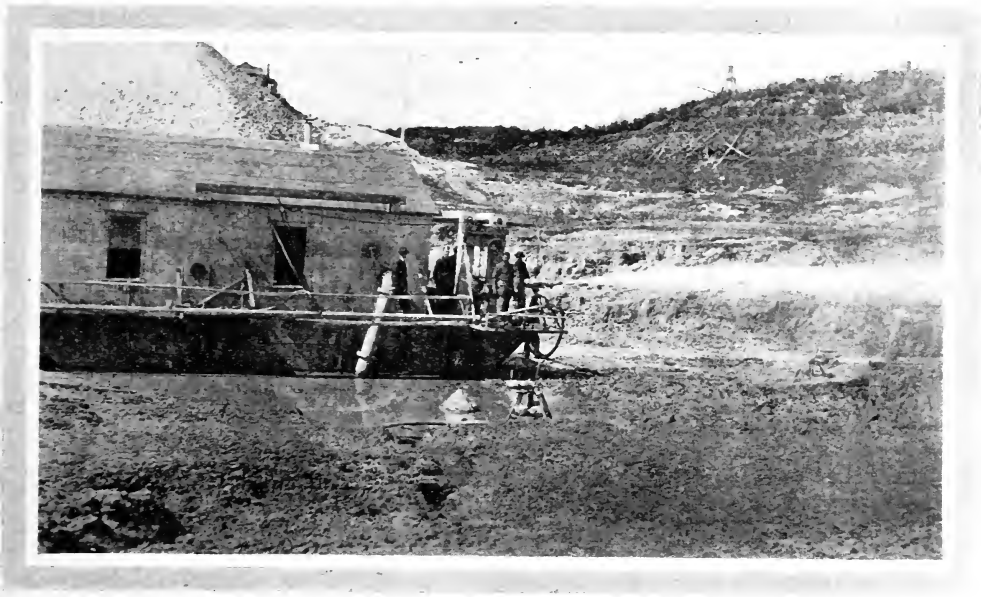
At Diabase Mountain the top of the hill is diabase while the base is composed of slates and conglomerates lying on Keewatin greenstones, so that certain veins as on the Penn Canadian and Bailey started in group 2 and continued down into group 3.

In south-east Coleman different conditions exist. Here the diabase sill is found intact with frequently a considerable deposit above it. The most noteworthy examples of group 1 are the veins of the Beaver and Temiskaming. On the Temiskaming property the upper contact between the Keewatin and the diabase is approximately 500 feet from the surface. Along this contact both above and below the Temiskaming and Beaver mines have recovered their richest ores. In order to ascertain the thickness of this diabase sill it was diamond drilled and the lower contact between the diabase and the Keewatin formations was found at an approximate depth of 1,670 feet from the surface. The sinking of the main shaft on the Temiskaming is now being continued to cut the lower contact in the hope of finding similar enrichments to those proven on the upper contact. If ore is found below this lower contact it will give the Temiskaming mine deposits in all three groups.

The Beaver and Temiskaming properties adjoin, the main shafts of the two properties being about 400 feet apart. The main shaft of the Beaver is down 1,350 feet while the Temiskaming is down 900 feet.

Production.

The following figures taken from the Preliminary Report of the Ontario Bureau of Mines show that since the opening of the mines at Cobalt the production of silver has amounted to over 234,000,000 ounces having a valuation of more than $122,000,000:



Pumping station on the pumped-out lake-bottom of Kerr Lake.

Temiskaming Mill, Cobalt, Ont.

Year.	Ounces.	Value.
		$
1904	206,875	111,887
1905	2,451,356	1,360,503
1906	5,401,766	3,667,551
1907	10,023,311	6,155,391
1908	19,437,875	9,133,378
1909	25,897,825	12,461,576
1910	30,645,181	15,478,047
1911	31,507,791	15,953,847
1912	30,243,859	17,408,935
1913	29,681,975	16,553,981
1914	25,162,841	12,765,461
1915	23,653,713	11,703,966
Totals	234,314,368	122,754,523

Nine Cobalt mines produced more than a million ounces each during 1915:

Mine.	Ounces.
Nipissing	4,610,051
Mining Corporation of Canada (Townsite)	2,776,589
Kerr Lake	2,109,355
Seneca Superior	1,996,257
Coniagas	1,916,616
Mining Corporation of Canada (Cobalt Lake)	1,566,206
Temiskaming	1,486,400
La Rose	1,071,694
McKinley-Darragh-Savage	1,061,827

The silver production according to camps was as follows:

—	Ounces.	Value.
		$
Cobalt proper	23,187,545	11,481,265
Casey Township	223,939	105,846
Gowganda	242,229	116,856
Silver recovered from auriferous ores	77,126	38,496
Totals	23,730,839	11,742,463

MILLING IN COBALT DURING 1915.

Mills and Mines.	Tons Milled.	Concentrates.			Concentration.
		Jigs.	Tables.	Totals.	
		Tons.	Tons.	Tons.	Ratio.
1 Beaver	28,110	136.3	285.5	421.8	67–1
2 Buffalo	55,697	.....	.....	750.0	74–1
3 Casey Cobalt	14,061	9.6	247.5	257.1	55–1
4 Cobalt Lake	34,719	233.8	681.5	915.3	37–1
5 Cobalt Reduction	97,132	186.8	1,552.8	1,739.6	56–1
6 Coniagas	54,767	36.0	374.0	410.0	133–1
7 McKinley-Darragh	63,568	269.0	1,447.3	1,716.3	37–1
8 Northern Customs—					
La Rose	56,472	.....	.....	1,388.0	40–1
Chambers-Ferland	6,434	.....	.....	314.9	20–1
Right-of-Way	5,755	.....	.....	115.8	49–1
9 Penn Canadian	28,515	139.9	491.2	631.1	45–1
10 Seneca Superior	8,654	145.6	387.6	533.2	16–1
11 Timiskaming	26,927	49.1	338.6	387.7	70–1
12 Trethewey	6,113	7.4	68.9	76.3	80–1
Total	486,924	.....	.....	9,657.1	50–1

Cyanide Mills.	Tons Milled.	Bullion Produced Oz.
13 Dominion Reduction—		
Campbell & Deyell	10.0	
Comet (Drummond)	18,697.5	
Crown Reserve	27,201.5	
Dominion Reduction	1,537.9	1,537,336
Drummond Fraction	2,595.5	
Glen Lake	2.8	
Kerr Lake	28,001.4	
14 Nipissing, Low Grade	77,729.0	2,126,310.76
15 O'Brien	52,883.0	526,272.00
Total	206,858.6	4,139,918.76

Total tons milled by water concentrating mills	486,924
Total tons milled by Cyanide Mills	206,858
Total tons milled, 1915	693,782
" " 1914	743,531
" " 1913	664,845
" " 1912	455,517
" " 1911	381,871
" " 1910	305,513
" " 1909	126,421
" " 1908	49,424
Grand Total	3,420,904

Buffalo.

Ten thousand five hundred and twenty-six tons of slimes from the low-grade mill concentration were cyanided producing 89,696 ounces silver bullion.

Mining Corporation of Canada, Ltd.

The Cobalt Reduction Mill cyanided slimes from the several properties of The Mining Corporation of Canada with the following results:

Mine	Tonnage treated.	Bullion produced. Oz.
Townsite City	28,796.63	296,770.33
Cobalt Lake	4,887.58	57,221.86
Total	33,684.21	353,992.19

O'Brien.

Besides the bullion produced, this mill made and shipped 212 tons of concentrates containing 262,255 ounces silver.

Coniagas.

In addition there were 155 tons of mine slime.

McKinley-Darragh.

Ninety-two tons of high grade ore hand-picked on the picking belt before milling.

High Grade Mills.

PRODUCTION DURING 1915.

Mill.	Tonnage milled.		Bullion produce d Oz.
	Raw Ore.	Concentrates.	
Buffalo	7	459	751,054
Nipissing —			
Nipissing	913	.....	2,151,709
Customs	552	.....	1,612,685
Totals	1,472	459	4,515,448

Buffalo. At the *Buffalo* high grade mill 806.5 tons of residues have been retreated during the year and 30,046 lbs. of mercury have been recovered. The price of mercury has advanced so much since this was purchased by the Buffalo Company that when now sold it nets the company an excellent return.

Nipissing. The only change made during the year in the high grade ore treatment is an important improvement whereby the large amount of amalgam produced is now retorted and melted to bullion in one heat in large graphite crucibles mounted in tilting furnaces.

The market for cobalt residue was poor on account of the war; the shipments amounted to only 326 tons.

ORE SHIPMENTS FROM COBALT SILVER DISTRICT FOR CALENDAR YEAR 1915,

Mine.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Totals.
1. Beaver	83.17	31.66	99.24	68.51	42.67	36.43	32.25	.....	53.73	30.54	111.93	31.50	621.63
2, Buffalo	.....	.....	.....	.....	.....	.....	.....	.....	351.06	92.89	61.27	62.11	567.33
3, Casey Cobalt	28.60	.....	.....	.....	.....	32.40	29.25	39.32	34.60	29.77	42.31	24.73	260.98
4. Chambers Ferland	.....	39.99	43.25	.....	133.59	52.53	28.04	29.17	.....	.....	.....	.....	326.57
5. Cobalt Comet—By Dom. Red	54.00	28.85	44.00	55.00	55.00	66.00	66.00	55.00	44.00	55.00	56.37	55.00	634.22
6. Coniagas	105.80	57.53	124.19	43.07	74.58	108.95	86.36	78.09	37.85	32.09	104.02	61.72	914.25
7. Crown Reserve	17.48	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	17.48
By Dom. Red	79.92	42.70	65.12	81.40	81.40	97.68	97.68	81.40	65.12	81.40	83.44	81.40	938.66
8. Kerr Lake	25.26	....	.....	.....	30.37	30.32	.....	.....	.....	.....	.....	30.35	116.30
By Dom. Red	82.08	43.85	66.88	83.60	83.60	100.32	100.32	83.60	66.88	83.60	85.69	83.60	964.02
9. La Rose	221.53	45.52	169.18	145.73	127.92	130.73	130.81	130.88	130.75	87.27	130.55	174.67	1,625.54
10. McKinley-Darragh	126.74	123.37	171.16	155.50	211.30	247.93	116.39	113.85	195.19	81.91	161.92	73.59	1,778.85
11. Mining Cor'p. of Canada—													
Cobalt Lake Mine	23.31	65.05	.....	100.97	78.68	84.68	107.47	86,20	172.40	216.22	92.28	194.61	1,221.87
Townsite City Mine	345.14	249.13	248.56	303.39	318.01	283.98	86.89	138.62	102.59	202.80	114.57	169.61	2,563.29
12. Nipissing	35.47	30.23	64.85	.....	64.37	.....	47.97	64.73	.....	103.99	.....	61.86	473.47
13. O'Brien	28.84	30.46	50.87	.....	.....	56.86	.....	32.45	74.96	.....	73.77	47.91	396.12
14. Penn Canadian	20.44	50.43	63.24	.....	66.43	143.14	70.68	68.64	63.35	31.83	72.99	34.13	685.30
15. Peterson Lake—Seneca	61.93	31.27	66.11	72.97	65.59	62.75	63.19	64.89	143.96	141.27	130.37	104.50	1,008.80
16. Right-of-Way	.....	.....	.....	.....	.....	.....	44.40	.....	.....	38.91	.....	42.12	125.43
17. Silver Queen	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	19.69	19.69
18. Temiskaming	.....	98.85	31.44	43.90	40.48	106.07	.....	40.54	42.91	31.68	87.80	28.76	552.43
19. Trethewey	40.90	43.39	40.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	124.29
Totals	1,380.61	1,012.28	1,348.09	1,154.04	1,473.99	1,640.77	1,107.70	1,107.38	1,579.35	1,341.17	1,409.28	1,381.86	15,936.52

ORE SHIPMENTS FROM THE COBALT

(In tons of

Mine.	1904	1905	1906	1907	1908
1. Badger					
2. Bailey			30.00		88.80
3. Beaver					
4. Buffalo		200.80	992.80	1,241.54	536.90
5. Casey Cobalt					10.00
6. Chambers Ferland					223.89
7. City of Cobalt				50.61	761.04
8. Cobalt Lake					225.97
9. Cobalt Townsite				143.22	177.71
10. Cobalt Comet (Drummond)	.50	32.15	274.70	104.13	1,161.38
11. Colonial			15.00	40.38	
12. Coniagas		30.60	422.02	2,447.37	610.25
13. Crown Reserve					657.35
14. Foster		83.85	117.00	312.13	191.20
15. Green Meehan			37.03	98.39	
16. Hargreave		28.45			
17. Hudson Bay				149.53	1,094.23
18. Imperial Cobalt				14.61	
19. Kerr Lake		54.95	158.35	319.76	660.24
20. King Edward		19.00		31.12	338.19
21. La Rose	60.05	607.86	854.61	2,815.45	4,843.17
22. Lawson		14.61		61.12	
23. Lost and Found					
24. Lumsden					
25. McKinley-Darragh	20.00	447.09	80.45	742.42	1,808 39
26. Mining Corporation of Canada :—					
Cobalt Lake Mine					
Townsite City Mine					
27. Nancy Helen				30.10	201.32
28. Nipissing	57.00	486.02	2,125.08	2,538.26	3,571.96
29. North Cobalt					
30. Nova Scotia			43.95	272.21	237.95
31. O'Brien		26.32	114.18	1,491.61	3,459.51
32. Penn Canadian				77.33	187.99
33. Petersen Lake (Leases)					
Gould					
Little Nipissing					40.67
Nova Scotia					
Seneca Superior					
34. Provincial					75.84
35. Princess				3.93	
36. Red Rock				45.71	
37. Right of Way			46.25	129.37	750.04
38. Rochester					
39. Silver Bar					.58
40. Silver Cliff					160.44
41. Silver Leaf		9.00		46.36	197.03
42. Silver Queen		44.73	130.94	478.57	885.70
43. Temiskaming				204.32	795.20
44. Temiskaming Cobalt			20.47	67.98	
45. Trethewey	21.00	218.58	198.48	833.58	1,408.69
46. University		16.00	55.28	60.23	
47. Victoria					.47
48. Violet		16.00	20.00		
49. Waldman					
50. Wyandoh					
Totals	158.55	2,336.01	5,836.59	14,851.34	25,362.10

Cobalt Lake, Cobalt Townsite and City of Cobalt are shown under the name of The Mining Corporation of Canada from 1914.

DISTRICT FOR THE YEARS 1904–1915.

2,000 lb.)

1909	1910	1911	1912	1913	1914	1915	Totals.
.....	.....	27.10	.....	.....	.....	.....	27.10
36.85	.....	20.00	41.57	150.35	20.50	.....	388.07
51.38	140.06	790.81	402.97	292.21	392.07	621.63	2,691.13
648.86	1,185.77	1,275.19	1,251.64	66.13	.....	567.33	7,966.96
8.50	48.40	277.74	214.34	401.54	608.30	260.98	1,829.80
517.88	885.92	622.85	501.29	223.78	308.06	326.57	3,610.24
566.82	329.40	281.30	230.00	105.14	495.71	.....	2,820.02
95.47	296.80	2,111.32	1,085.22	1,196.33	919.01	.....	5,930.12
27.35	310.99	703.51	1,944.77	2,762.54	1,950.73	.....	8,020.82
1,225.47	2,194.41	714.83	458.85	610.06	587.03	634.22	7,997.73
.....	178.60	114.10	86.48	21.56	.....	.....	456.12
806.93	1,261.46	1,813.89	2,119.87	1,620.40	1,217.26	914.25	13,264.30
3,167.52	2,184.25	977.32	561.65	791.15	1,067.00	956.14	10,992.38
113.90	.....	.....	.....	.....	4.50	.....	822.58
.....	.....	102.98	.....	12.96	.....	.....	251.36
.....	343.68	102.44	17.35	.....	.....	.....	491.92
743.64	260.33	898.88	694.55	609.14	647.95	.....	5,098.25
.....	.....	.....	.....	.....	.....	.....	14.61
1,173.42	5,088.78	1,292 58	788.10	933.35	628.42	1,080 32	12,178.27
146.58	134.12	20.00	.....	87.21	.....	.....	776.22
6,757 21	5,131.53	3,581.54	3,511.40	3,275.14	1,582.54	1,625.54	34,646.04
.....	.....	.....	.....	.....	.....	.....	75.73
.....	.....	.....	65.20	8.80	.....	.....	74.00
.....	.....	.....	.....	20.00	.....	.....	20.00
1,056,49	2,395.39	3,238.64	2,673.40	2,865.66	2,903.50	1,778.85	20,008.28
.....	.....	.....	.....	.....	223.37	1,221.87	1,445.24
.....	.....	.....	.....	.....	533.40	2,563.29	3,696.69
116.32	.....	.....	.....	.....	.....	.....	347.74
6,470.52	6,833.81	2,952.20	1,869.27	1,950.22	1,235.07	473.47	30,562.88
6.87	.....	3.00	.....	.....	.....	.....	9.87
224.79	.....	.....	.....	.....	.....	.....	778.90
1,419.11	608.57	628.44	711.43	703.43	523.21	396.12	10,081.93
339.01	285.62	22.40	126.35	332.18	460.53	685.30	2,516.71
.....	.....	.....	.....	.....	122.52	.....	122.52
.....	.....	.....	.....	9.00	50.05	.....	59.65
39.62	313.76	28.45	.....	.....	.....	.....	422.50
121.15	.....	.....	.....	.....	.....	.....	121.15
.....	.....	.....	432.97	457.93	398.96	1,008.80	2,298 66
.....	52.05	100.54	22.22	.....	.....	.....	250.65
.....	.....	.....	.....	.....	.....	.....	3.93
.....	.....	.....	.....	.....	.....	.....	45.71
1,608.99	981.41	636.06	243.24	146.12	184.16	125 43	4,881.07
.....	28.30	.....	.....	.....	.....	.....	28.30
.....	.....	2.72	.....	20.00	20.00	.....	43.30
149.06	156.84	92 30	.....	48.05	.....	.....	606.69
.....	.....	.....	.....	.....	.....	.....	252.39
316.64	.....	.....	31.25	201.98	105.42	19.69	2,214 92
852.14	1,119.12	855.60	967.31	406.26	417.56	552.43	6,169.94
.....	.....	.....	.....	.....	.....	.....	88.45
1,134.50	536.64	602.98	579.10	587.54	613.28	124.29	6,858.66
.....	.....	.....	.....	.....	.....	.....	231.51
.....	.....	.....	.....	.....	.....	.....	.47
.....	.....	.....	.....	.....	.....	.....	36.00
.....	38.81	.....	.....	.....	.....	.....	38.81
.....	24.15	.....	.....	.....	.....	.....	24.15
29,942.99	33,976.97	24,921.71	21,631.79	20,916.16	18,220.71	15,926.52	214,091.44

TABLE SHOWING SHIPMENTS FROM ELK LAKE AND GOWGANDA FOR THE YEARS 1909-1915.

(In tons of 2,000 lb.)

Mine.	1909	1910	1911	1912	1913	1914	1915	Total.
Elk Lake.								
Beaver Auxiliary	.....	.....	.....	.....	.....	1.26	.....	1.26
Downey	.....	.....	.....	.....	.....	9.60	.....	9.60
Hitchcock	.....	.....	4.00	.....	.....	.....	.....	4.00
Lucky Godfrey	.....	17.00	.....	.....	.....	.....	.....	17.00
Mapes Johnston	.....	.....	.....	.....	.....	.....	2.71	2.71
Moose Horn	.....	3.00	.....	.....	.....	.....	.....	3.00
Gowganda.								
Bartlett	2.00	.....	6.75	.....	.....	.....	.....	8.75
Bonsall	.....	6.78	.....	.....	.....	.....	.....	6.78
Boyd Gordon	.....	30.00	1.25	.....	.....	.....	.....	31.25
Burke Remey	.....	2.00	.....	.....	.....	.....	.....	2.00
Calcite Lake	.....	.....	.....	8.50	.....	.....	.....	8.50
Canadian Gowganda	.....	.....	.....	8.00	.....	.....	.....	8.00
Everett	.....	8.35	.....	.....	.....	.....	.....	8.35
Mann	.....	.....	.....	16.00	20.00	20.00	.....	56.00
Millerett	.....	346.30	128.00	118.00	.....	.....	.....	662.30
Miller Lake O'Brien	.....	31.00	116.50	112.60	172.90	118.80	116.70	668.50
Powerful	.....	1.00	.....	.....	.....	.....	.....	1.00
Reeves Dobie	.....	61.00	5.00	.....	.....	.....	.....	66.00
Welsh	.....	1.25	.....	.....	.....	.....	.....	1.25
Totals	2.00	506.68	262.50	333.10	192.90	149.66	119.41	1,566.25

STATEMENT SHOWING SHIPMENTS FROM COBALT DISTRICT, INCLUDING GOWGANDA, ELK LAKE AND SOUTH LORRAIN.

(In tons of 2,000 lb.)

Year.	Cobalt.	Gowganda.	Elk Lake.	S. Lorrain.	Totals.
1904	158.55	.....	.....	.....	158.55
1905	2,336.01	.....	.....	.....	2,336.01
1906	5,836.59	.....	.....	.....	5,836.59
1907	14,851.34	.....	.....	.....	14,851.34
1908	25,362.10	.....	.....	43.25	25,405.35
1909	29,942.99	2.00	.....	112.59	30,057.58
1910	33,976.97	486.68	20.00	226.64	34,710.29
1911	24,921.71	267.00	4.00	530.51	25,733.22
1912	21,631.79	333.10	.....	478.00	22,442.89
1913	20,916.16	192.90	.....	120.00	21,229.06
1914	18,220.71	138.80	10.86	49.46	18,419.83
1915	15,944.82	119.41	.....	.....	16,064.23
Totals	214,099.74	1,539.89	34.86	1,560.45	217,234.94

BULLION SHIPMENTS FROM THE COBALT DISTRICT, CALENDAR YEAR 1915.

Mine.	Fine oz.	Value. $
Buffalo	840,750.00	416,842.00
Casey Cobalt	4,815.36	2,275.23
Cobalt Comet	233,081.80	115,402.36
Crown Reserve	378,060.28	187,833.47
Dominion Reduction	824,237.66	409,514.24
Kerr Lake	62,730.54	23,512.78
McKinley-Darragh	8,741.46	4,152.19
Nipissing and Customs	5,898,809.13	2,954,638.55
O'Brien	536,327.00	285,229.00
Penn Canadian	1,755.50	831.39
Townsite-City	317.912.45	166,013.85
Trethewey	2,507 81	1,118.63
Total	9,109,728.99	4,567,363.69

DIVIDENDS PAID BY COBALT MINES TO 31ST DECEMBER, 1915.

Mining Company.	Percentage Paid During 1915	Amount of Dividends and Bonuses Paid During 1915	Total Percentage Paid to 31st Dec.. 1915	Total amount of Dividends and Bonuses Paid to 31st Dec., 1915.
		$ c.		$ c.
1 Beaver	6	120,000 00	29.5	590,000 00
2 Buffalo	.....	.....	282	2,787,000 00
3 Caribou-Cobalt (Drummond)	12.5	125,000 00	22.5	225,000 00
4 Casey Cobalt	.....	.....	.....	203,249 33
5 City of Cobalt	.....	.....	23	139,321 42
6 Cobalt Central	.....	.....	4	192,845 00
7 Cobalt Lake	.....	.....	15.5	465,000 00
8 Cobalt Silver Queen	.....	.....	21	315,000 00
9 Cobalt Townsite	.....	.....	97.5	966,726 31
10 Coniagas	15	600,000 00	196	7,840,000 00
11 Crown Reserve	8	141,505 12	345	6,102,399 30
12 Foster	.....	.....	5	45,774 00
13 Hudson Bay (T. & H.B.)	.....	.....	25,000	1,940,250 00
14 Kerr Lake (Holding Co.)	20	600,000 00	204	6,120,000 00
15 La Rose (Holding Co.)	5.5	412,122 42	74.5	*1,204,862 00 5,378,120 47
16 McKinley-Darragh	12	269,723 04	205	4,606,751 26
17 Mining Corporation of Canada	25	518,750 00	37.5	778,125 00
18 Nipissing Mines Co. (Holding Co.)	20	1,200,000 00	224	†400,000 00 13,440,000 00
19 Right of Way Mining Co.	.....	.....	65	324,643 93
Right of Way Mines, Ltd.	.....	.....	13	219,110 00
20 Peterson Lake	5.25	126,095 55	10.5	252,191 10
21 Seneca Superior	70	335,218 80	205	981,212 20
22 Temiskaming	3	75,000 00	59	1,459,156 25
23 Trethewey	.....	.....	108	1,061,998 50
24 Wettlaufer	.....	.....	45	637,465 50
Totals	.....	4,523,414 93	.....	57,614,201 57

* Profits paid to owners previous to May 31st, 1908.
† Paid to Syndicate in 1905-6.

Smelting.

At the present time when an endeavor is being made to bring more within the British Empire the complete cycle of operations of the winning and refining of our mineral resources, it is interesting to find out how much of the production of the Cobalt mines is refined in Canada.

In the early days of the Cobalt Camp all ore had to be shipped to the United States for treatment. Soon Canadian smelters were started which treated high grade ore, and the latest development has been the building of the so-called High Grade Mills at Cobalt, which produce silver bullion by a combination amalgamation—cyanide process.

An examination of the figures for the calendar years 1914 and 1915 shows that the percentage of the silver bullion produced from Cobalt ores was in round numbers:

	1914. %	1915. %
Cobalt Mills Amalgamation and Cyanide	44	39
Southern Ontario Smelters	39	45
United States Smelters	17	16
	100	100

The sixteen per cent. still going to the United States consists of some high grade ore along with all the low grade material both ore and concentrates shipped, as the Canadian smelters are not equipped to handle this low grade material.

In the high grade mills at Cobalt the silver only is recovered, the cobalt, nickel and arsenic being left in the residue for future treatment or sold for the cobalt content. The Deloro and Coniagas smelters are equipped with complete refineries so that besides producing silver bullion they also produce and market arsenic, cobalt and nickel.

The cobalt and nickel have been produced mostly as oxides, but as there has recently been a call for the metals they are now also produced in that form.

Coniagas Reduction Company.

No alterations have been made in the purchasing schedule of the company during the year. The only addition to the plant to be reported is the erection of extra storage bins for by-products for which there has been little or no sale since the outbreak of the war. The output of the smelter up to the 31st December, 1915, is as follows:

Year.	Ore Treated Tons.	Silver Fine Oz.	Cobalt Oxide Tons.	Nickel Oxide Tons.	White Arsenic Tons.
1908	266.80	360,683	5.5	1.5	13.5
1909	1,116.90	1,659,604	.9	.....	100.0
1910	2,017.25	3,485,243	53.8	13.2	557.7
1911	2,821.50	5,770,271	60.5	17.3	766.1
1912	2,288.77	4,824,632	129.0	50.7	636.7
1913	2,509.80	4,977,012	250.6	115.6	319.4
1914	1,968.78	3,865,546	171.9	124.9	399.2
1915	2,541.00	3,445,661	59.0	99.8	472.8
Total	15,530.80	28,388,652	731.2	423.0	3,265.4

DELORO MINING AND REDUCTION COMPANY, LTD.

During the year a new building and complete plant for the production of cobalt and nickel metals was completed and put into operation. A plant has also been installed for the manufacture of the alloy known as "Stellite," a high speed tool metal which is far superior for certain purposes to any high speed tool steels at present known. This alloy contains a considerable quantity of cobalt and chromium, but no iron. Considerable progress has been made in connection with the introduction of electroplating with cobalt on a commercial scale, and it now looks probable that it will be adopted to a considerable extent.

The by-product markets were somewhat restricted on account of the war, but the prospects look better for 1916.

The plant was operated at a considerably increased tonnage over the previous year and present indications point to a still larger tonnage being handled in 1916.

PRODUCTION OF DELORO SMELTER, 1908–1915.

Year.	Ore Treated Tons.	Silver, Fine Oz.	Cobalt and Mixed Oxides Tons.	Refined Arsenic Tons.
Previous to 1913	11,065	20,339,860	500	3,275
1913.....	2,920	6,350,500	190	893
1914.....	3,612	5,207,000	300	1,038
1915.....	4,634	6,429,794	256	1,634
Totals.....	22,231	38,327,154	1,246	6,840

The Standard Smelting and Refining Co. moved its works during the year from North Bay to Chippewa, Ontario, where more commodious works are being erected. It is expected that these will be ready to treat ore by the spring of 1916.

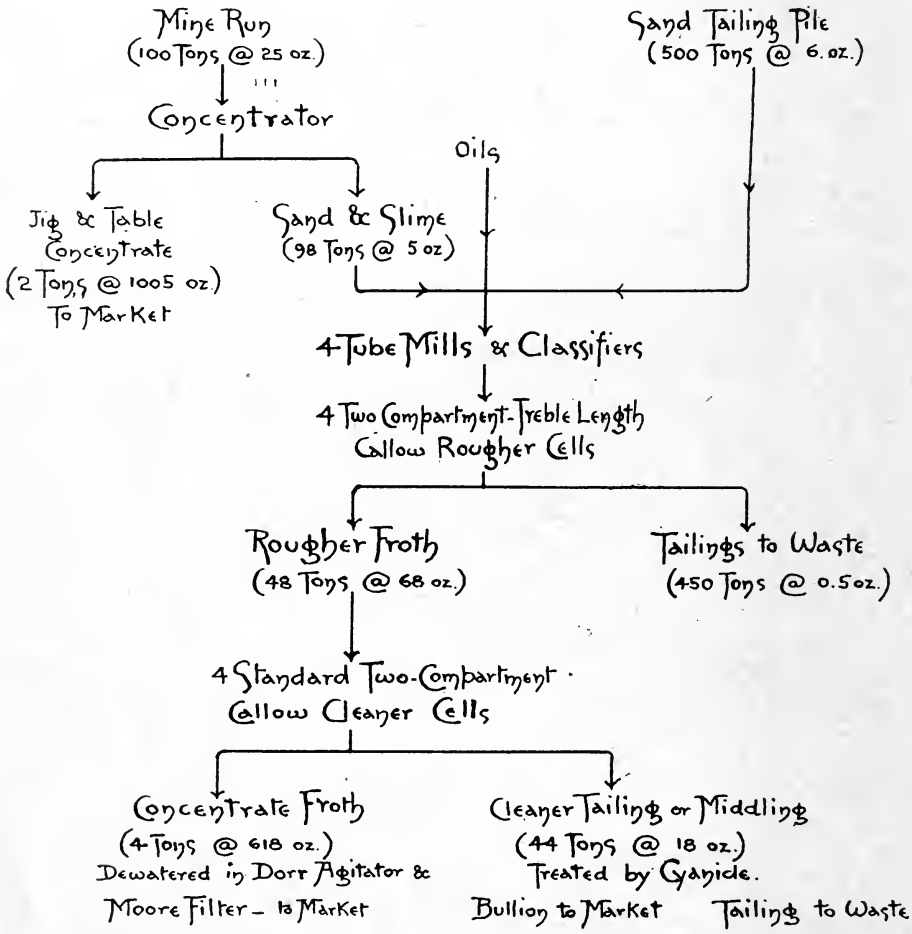
Concentration by Oil Flotation.

The applicability of concentration by oil flotation to Cobalt ores has been demonstrated and a number of companies are now planning oil flotation installations.

The most extensive experimental work has been carried on at the Buffalo Mine where a 50-ton plant was put into operation in the fall of 1915 using the Callow Pneumatic Process. The results obtained from this plant were so satisfactory that a larger installation was deemed desirable, and work is now well under way installing a flotation plant to have a daily capacity of 600 tons.

The fine grinding equipment will consist of four 5 ft. 6 in. x 20 ft. 0 in. tube-mills and the flotation equipment will be four, two-compartment, treble length, Callow Pneumatic cells used as roughers, followed by four standard two-compartment Callow Pneumatic cells used as cleaners. The old cyanide plant will be used for de-watering the flotation concentrate and for the treatment by cyanide of a quantity of flotation middling.

The process is one which is particularly applicable to the low grade material which makes up the tailing piles of the camp and will make available for treatment immense tonnages of rock which heretofore have been considered of little or no immediate value.



Flow Sheet—Flotation Plant—Buffalo Mines, Ltd.

At the Buffalo it is proposed to treat 600 tons daily made up of 100 tons of mine rock and 500 tons of material from the old tailing pile. The mine rock will be run through the concentrator as formerly and the tailing resulting will be sent to tube-mills for further grinding. The 500 tons of material from the tailing pile will be sent directly to tube-mills and the whole product ground to pass 120 mesh. This material after the addition of suitable oils to be sent to the flotation cells where the valuable mineral is floated and collected and the worthless gangue run to waste.

The product collected, containing the silver values, will be run to cleaner cells where a further separation will be made dividing the values into two products, one for shipment and one which will be treated by cyanide on the property.

The tonnages and values in the different products, based upon the experimental work done, will be approximately as indicated in the accompanying flow sheet.

Good results are obtainable by returning the cleaner tailing to the rougher cell. There appears at present to be a decided advantage, however, in treating a small tonnage of a middling by cyanide owing to the slightly greater total recovery and to the saving effected in freight and smelter charges.

Construction is well under way and the plant should be in operation early in the summer of 1916.

The McKinley-Darragh-Savage Company is installing a 200-ton unit for the treatment of current tailing, and several other companies are carrying on flotation experimental work and have plants in contemplation.

Casey Township

Considerable prospecting was done in this district, but the only producer yet is the Casey Cobalt.

Gowganda

Shipments have continued regularly from the *Miller-Lake-O'Brien Mine* throughout the year, but this was the only shipping operating property.

Small forces have been operating on the *Hewitt Claim*, as well as on the *Powerful* at Calcite Creek, and the *Rogers Claims* at Flatstone Lake. In December the *Reeves-Dobie* claims were re-opened under new management.

South Lorrain

No shipments were made during the year, but the *Bellellen, Keeley* and *Currie* carried on some operations.

NICKEL

The Mond Nickel Company continued during the year to take ore from the *Alexo Mine* to be mixed with their own ore and treated at their smelter at Coniston, Ontario. The Alexo ore has a higher average nickel content than the Sudbury ores, but is very low in copper. To work the Mond process to the best advantage the nickel and copper contents of the ores treated should be approximately equal. The Mond Company's ores are higher in copper than in nickel, so they use the Alexo ores as an equalizer. The magnesian content is also a favorable feature.

A statement of shipments for the year 1915 is given herewith:—

NICKEL SHIPMENTS OVER THE T. & N. O. RY.

For the Calendar Year 1915.

Month.	Tons (2,000 lb.)
January	808.03
February	839.15
March	878.95
April	665.00
May	981.95
June	989.10
July	1,070.80
August	766.50
September	583.90
October	799.85
November	1,305.10
December	1,282.95
Year	10,971.55 tons.

COPPER

A shipment of 22½ tons of copper ore was made from a property on Portage Bay, near Latchford, to the sampling works of Campbell & Deyell, at Cobalt, whence it was shipped in January, 1916, to the United States Metals & Refining Company, at Chrome, New Jersey. The ore is chalcopyrite and assays:—

Copper ..... 13.33 per cent.
Silver ..... 12.6 oz.

ZINC AND LEAD

The old *Wright Mine* on the Quebec side of Lake Temiskaming, which was known as long ago as 1744, was recently pumped out by the owners, the Timmins-McMartin Syndicate. It was thoroughly sampled, but future development of this property has not yet been announced. The ore is a galena containing a little silver.

Wolf Lake.

Several promising veins containing zinc blende and galena have been located near Wolf Lake, about three miles from Bourkes station, mileage 183½, on the T. & N. O. Ry., but very little development has yet been done on them.

MOLYBDENITE

Specimens of excellent molybdenite have been produced from small veins from properties in the vicinity of Tomiko, mileage 28½, on the T. & N. O. Ry., but commercial quantities have not yet been produced.

LIMESTONE

The requirements of the sulphite-pulp plant of the Abitibi Power & Paper Co., of Iroquois Falls, for a dolomitic limestone are supplied from a quarry near Haileybury. During the year shipments of this material amounted to sixty-eight cars, containing 2,401 tons.

RECORD OF DEEP WELLS ALONG THE LINE OF THE T. & N. O. RY.

In the year 1914 Report a list was given of some of the wells drilled along the T. & N. O. Ry., with the idea that such information should be put on record in order to be of value to others putting down wells in the same localities. While the record is far from complete the work has already been justified and better records are likely to be kept of any future drilling. The records of a number of wells, mostly drilled during 1915, are published herewith.

The general conclusions reached in connection with the wells drilled are:—

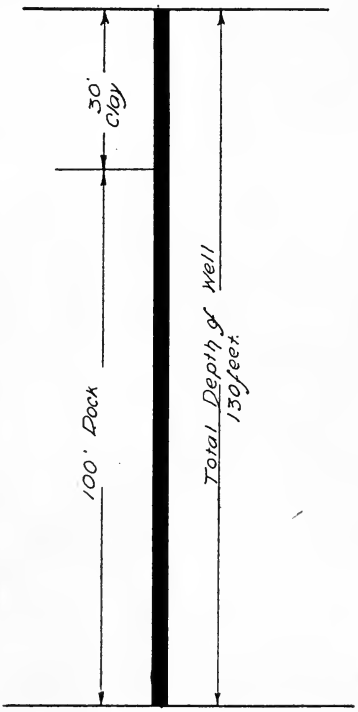
(*a*) Little or no water is found in clay or hard pan.

(*b*) Plenty of water is usually found in clean sand or gravel.

(*c*) In drilling limestone, water is usually found on the top of the rock, with a better supply lower, particularly on the contact of the limestone with harder rock.

(*d*) It is rare to find water in hard rock.

T. & N. O. Ry.
RECORD OF DEEP WELLS
AT MONTEITH
WELL NO. 1.

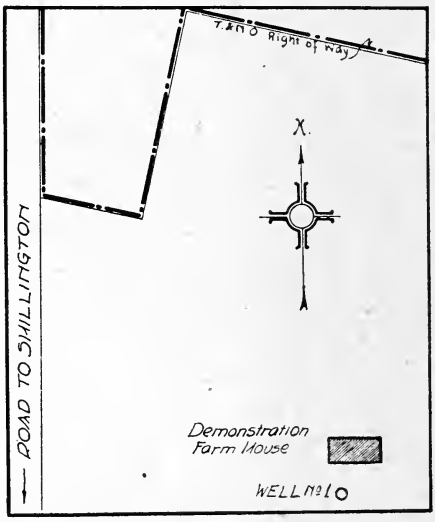


LOCATION:- About 15' in rear of Demonstration Farm House.

DATE BEGAN DRILLING:- 1914.

WELL COMPLETED:- 1914

NOTE:- Well delivers from 3 to 6 Barrels per day.



NORTH BAY, ONT. FEB. 7th 1916

Correct:- Approved:-

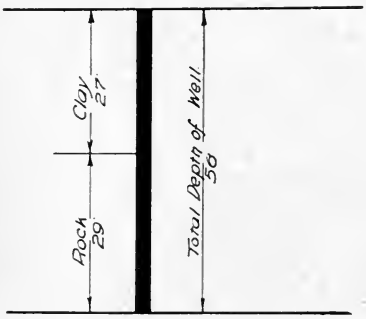
Chief Draughtsman C.E. & S. of M

DRAWN BY R.S.H.
TRACED BY R.S.H.

T & N. O. Ry

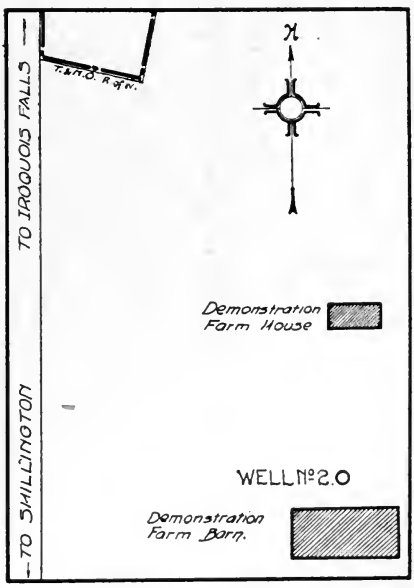
RECORD OF DEEP WELLS AT MONTEITH

WELL No 2



LOCATION - About 20' North of Barn Demonstration Farm, Monteith.
DATE BEGAN DRILLING:- 1914.
WELL COMPLETED:- 1914.

NOTE:- No Water Obtained



NORTH BAY ONT FEB. 7TH 1916

Correct -

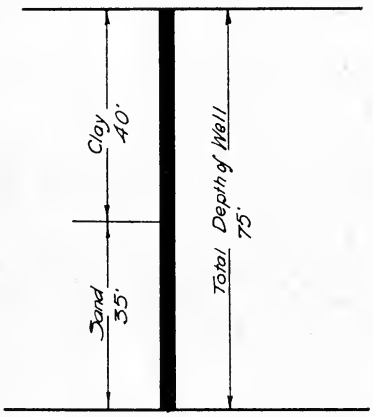
Chief Draughtsman

Approved -

C E & S of M

DRAWN BY R S M
TRACED BY R S M

T. & N. O. Rly.
RECORD OF DEEP WELLS
AT MONTEITH
WELL No 3.

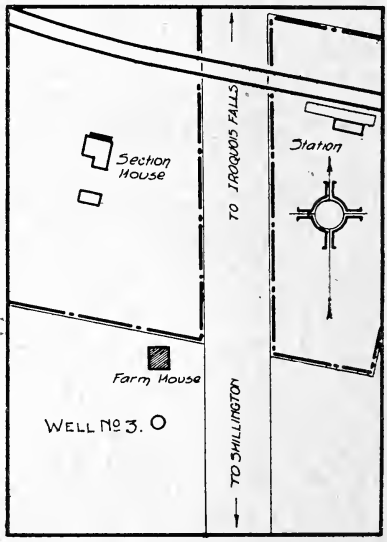


LOCATION:- About 50' South of Farm House in rear of Section House On Township road.

DATE BEGAN DRILLING:- 1915.

WELL COMPLETED:- 1915.

NOTE:- This well pumps 3½ gals per minute. Had water 24 hours after began drilling.



NORTH BAY, ONT FEB. 7TH 1916

Correct:-

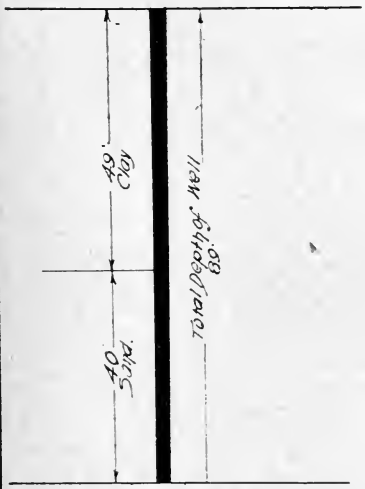
Approved:-

Chief Draughtsman.

C E & S of M.

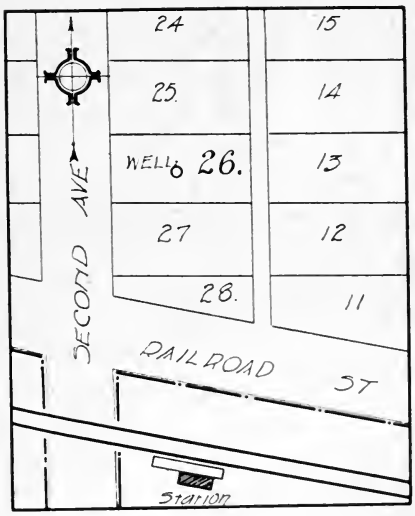
DRAWN BY R.S.H
TRACED BY R.S.H

T. & N. O. R.
RECORD OF DEEP WELLS
AT MONTEITH
WELL No 4.



LOCATION - J Whittons on Lot 26 Con. II Twp of Walker Townsite of Monteith.
DATE BEGAN DRILLING -
WELL COMPLETED -

NOTE - Well pumped 4 gals. per minute from the sand This well was pumped for a day and gave just as much water when stopped pumping as it did when started to pump



NORTH BAY. ONT FEB 7th 1916

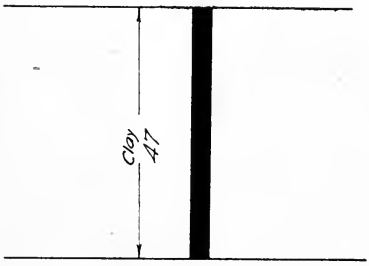
Correct -

Chief Draughtsman

Approved -

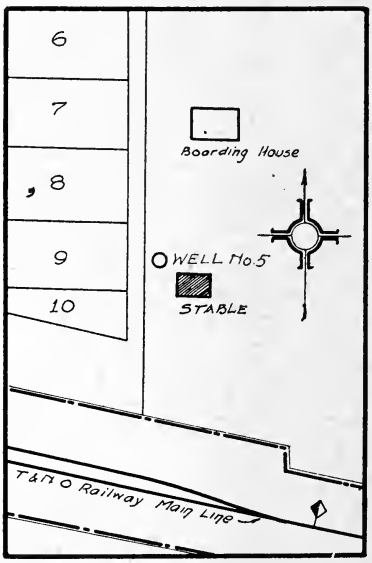
C.E. & S. of M.

T & N O Rly
RECORD OF DEEP WELLS
AT MONTEITH
WELL No 5



LOCATION - North of the Monteith Pulp and Lumber Co's Stable
DATE BEGAN DRILLING :-
WELL COMPLETED:-

NOTE -

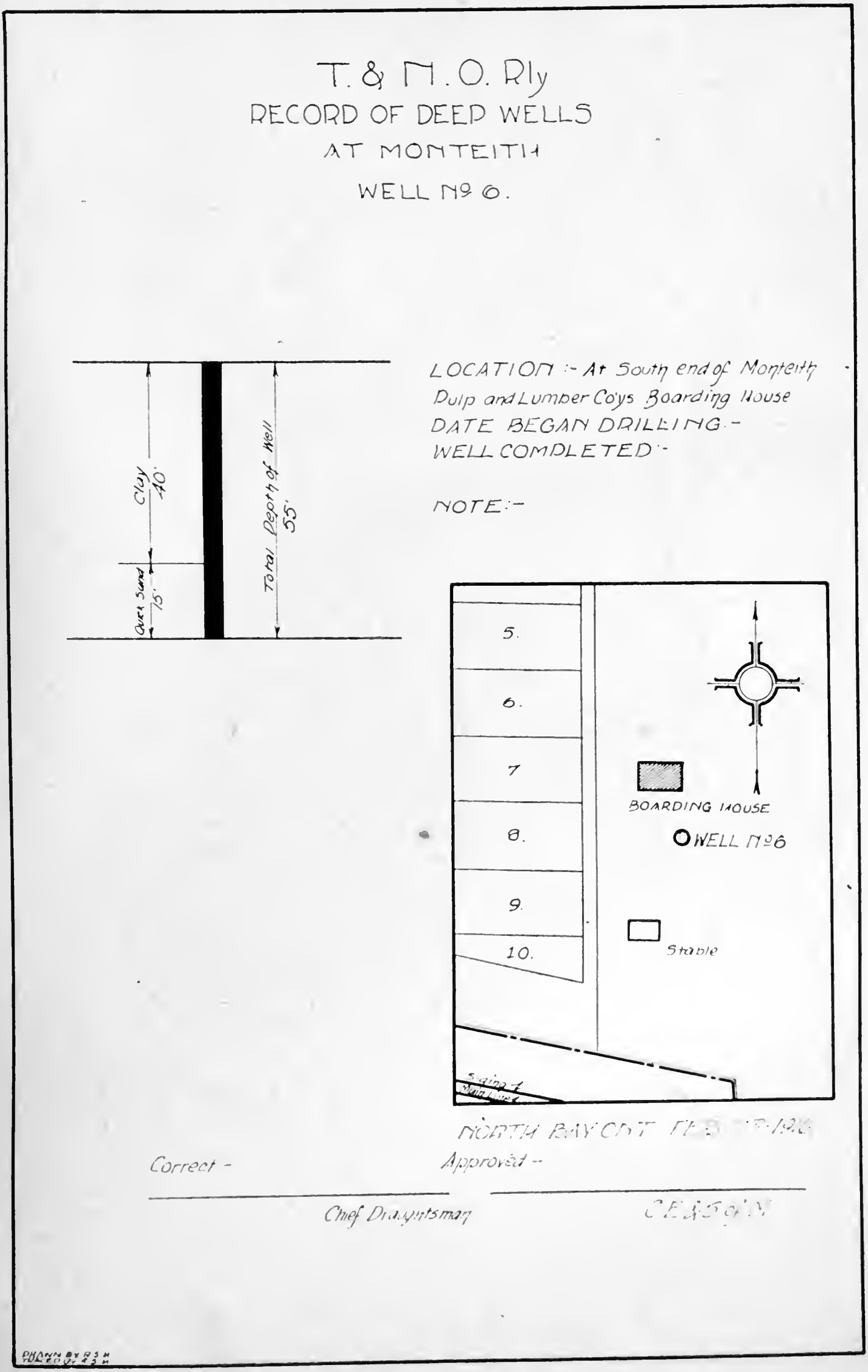


NORTH BAY ONT FEB. 7TH 1916

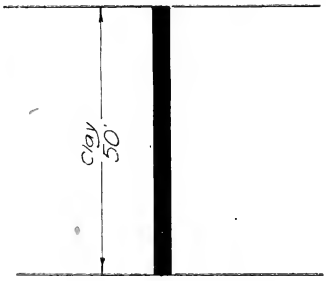
Correct:- Approved:-

Chief Draughtsman CE&S of M

DRAWN BY R&M
TRACED BY R&M


T. & N. O. Rly
RECORD OF DEEP WELLS
AT MONTEITH
WELL No 6.
Clay 40'
Quick Sand 15'
Total Depth of Well 55'
LOCATION :- At South end of Monteith Pulp and Lumber Co'ys Boarding House
DATE BEGAN DRILLING -
WELL COMPLETED -
NOTE :-
5.
6.
7
8.
9.
10.
BOARDING HOUSE
WELL No 6
Stable
Correct -
Approved -
Chief Draughtsman

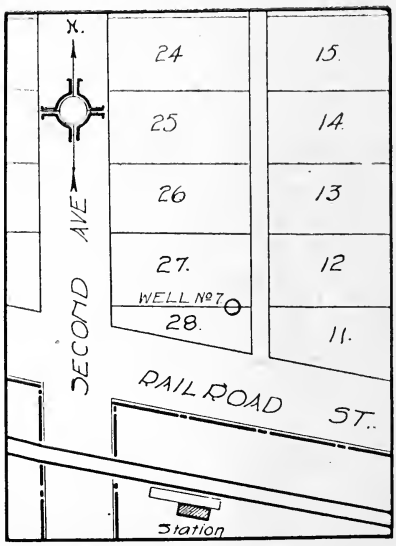
T. & N. O. Rly.
RECORD OF DEED WELLS
AT MONTEITH
WELL No 7.



LOCATION:- On north side of track

DATE BEGAN DRILLING:-
WELL COMPLETED:-

NOTE -



NORTH BAY ONT. FEB. 7TH 1916

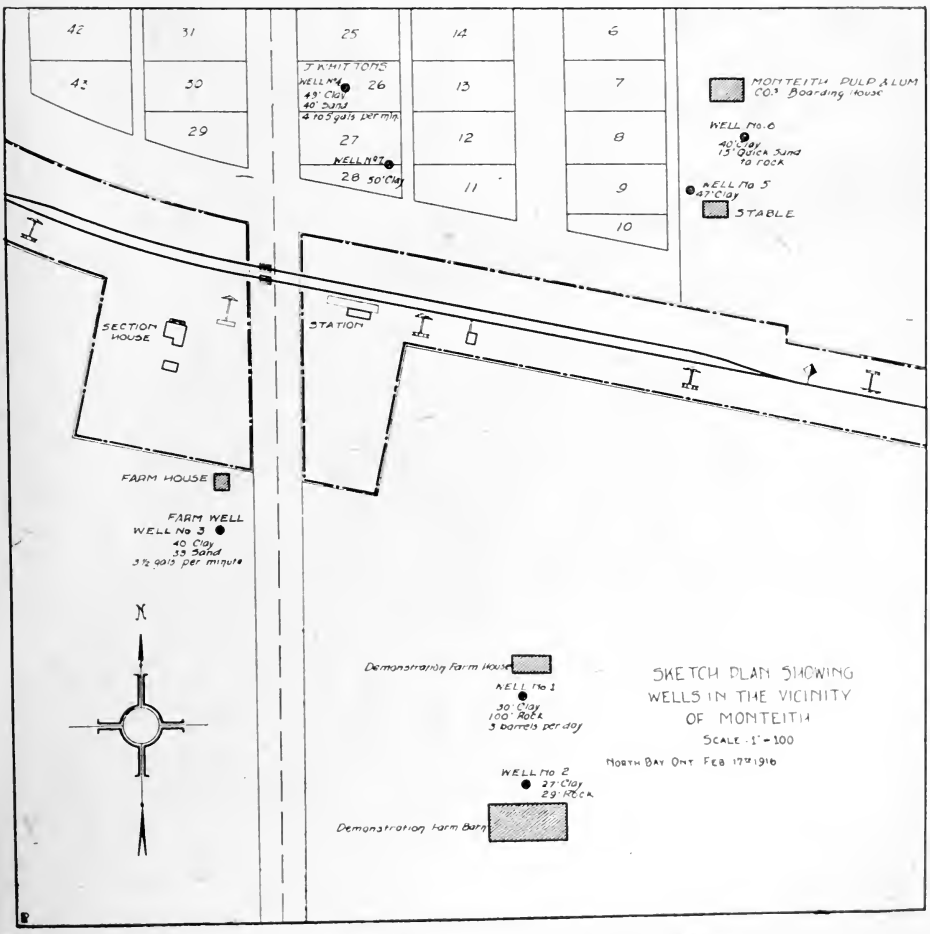
Correct:-

Approved -

Chief Draughtsman

C E & S of M.

DRAWN BY R S M.
TRACED BY R S M.



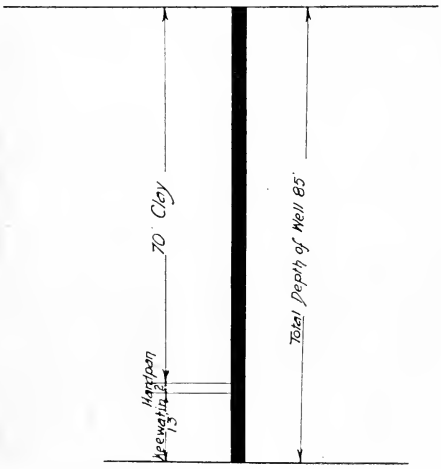
Sketch plan showing wells in the vicinity of Monteith.

T. & N. O. R.

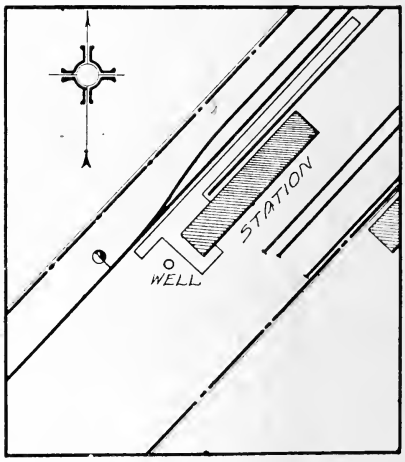
RECORD OF DEEP WELLS

AT CHARLTON

WELL No. 1



LOCATION:- Charlton Station
DATE BEGAN DRILLING:- April 5th 1915
WELL COMPLETED:- April 21st 1915
NOTE:- No Water Obtained

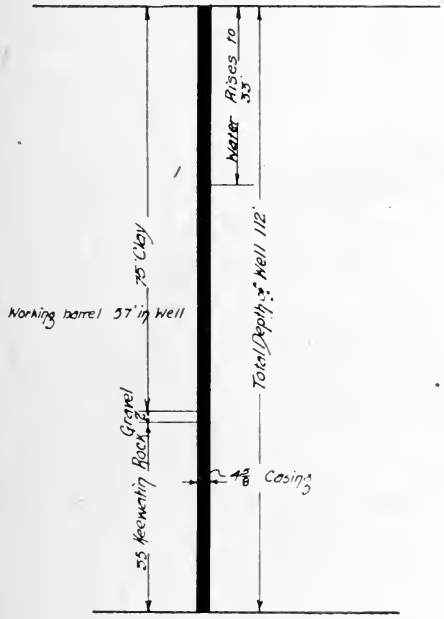


Correct -
G. H. Dickson
Chief Draughtsman

Approved -
D. McCrae
Chief Engineer.

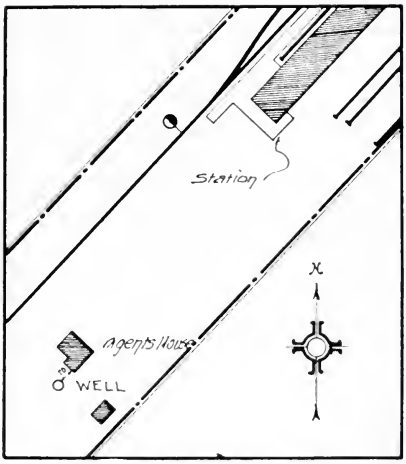
DRAWN BY R.S.M.
TRACED BY R.S.M.

T. & N. O. Rly
RECORD OF DEEP WELLS
AT CHARLTON
WELL No. 2



LOCATION :- About 20 West of Agents house
DATE BEGAN DRILLING :- April 27th 1915
WELL COMPLETED :- June 16th 1915

WATER LEVELS :- Water rises within 33 ft. of Surface when delivering 95 gals per hour.



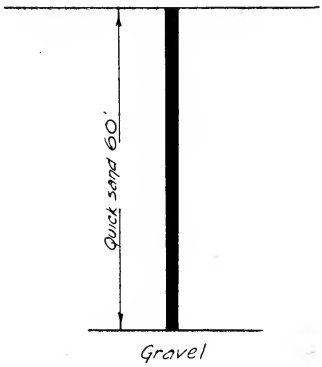
NORTH BAY ONT JAN 17th 1916

Correct :- G. H. Dickson, Chief Draughtsman

Approved :- [signature], Chief Engineer

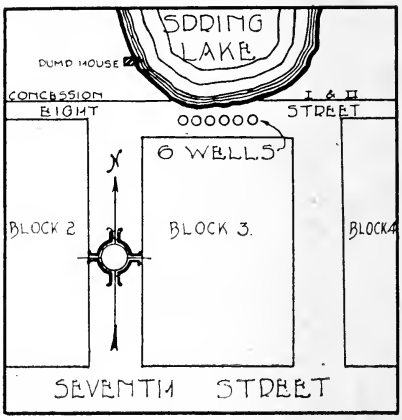
DRAWN BY R.S.H.
TRACED BY R.S.H.

T & N O Rly
RECORD OF DEEP WELLS
AT COCHRANE
6 WELLS



LOCATION:- South end of Spring Lake on the Town's Farm Lot No. 22 Con. No 2. Twp. of Glackmeyer. Town of Cochrane
DATE BEGAN DRILLING:-
WELL COMPLETED:-

NOTE:- Springs showed on the surface of the ground before the wells were driven. Well drilled in a bed of quicksand and went down to a depth of 60 feet and found gravel from which the water flows over the top of the wells. Some of these 6 wells fill a three inch pipe and others not quite that much.

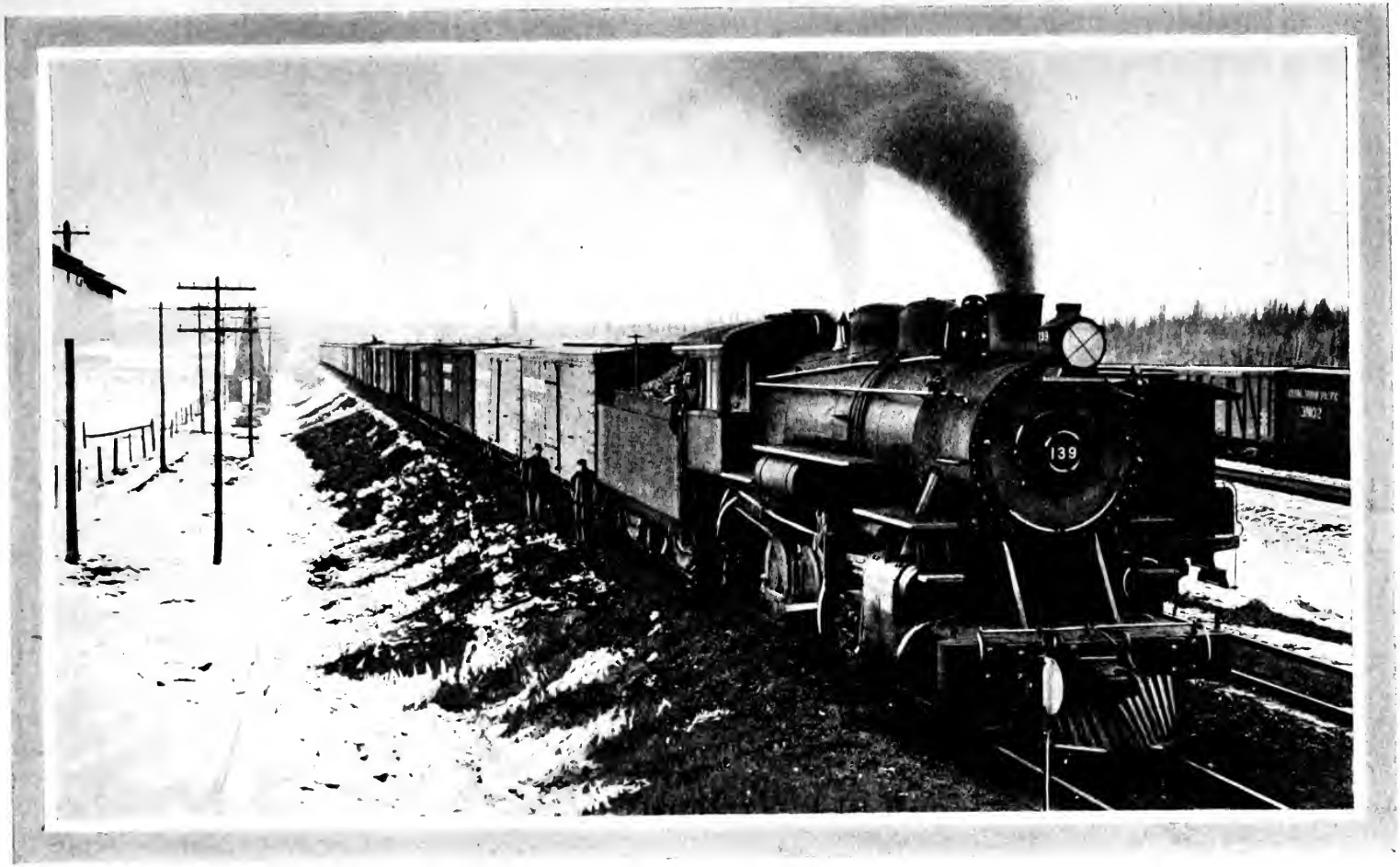


NORTH BAY, ONT. JAN 21ST 1910

CORRECT:- ADDROVED:-

Chief Draughtsman Chief Engineer

PLANS BY J.S.M.
TRACED BY J.S.M.



First Through Train of Western Grain over the New Transcontinental Route (C. G. Rys., T. & N. O. Ry., G. T. Ry.). Moved January 5th, 1916.

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The Mining industry in that part of northern Ontario served by the Temiskaming and Northern Railway